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Knowing more than they can tell: An assessment of genre awareness among students in writing intensive zoology and civil engineering courses

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KNOWING MORE THAN THEY CAN TELL: AN ASSESSMENT OF GENRE AWARENESS AMONG STUDENTS IN WRITING INTENSIVE ZOOLOGY AND CIVIL ENGINEERING COURSES

BY

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DEDICATION

This dissertation is dedicated to Roy E. Hanson who gave so much, yet never gave up.

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ABSTRACT

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Joleen Kidwell Hanson

University of New Hampshire, September, 2009

Developing genre awareness as a means of "learning how to learn" in new writing situations is a goal of four recently proposed writing pedagogies that recognize the context-dependent nature of standards for "good writing" (Devitt, Reiff, and Bawarshi (2004); Beaufort (2007); Johns (2008); Downs and Wardle (2007)). Yet other scholars argue that useful genre knowledge cannot be taught explicitly in the classroom, but must be acquired tacitly through participation in a workplace or other discourse community (Dias et al. (1999); Freedman (1994); Smit (2004)).

This qualitative study investigates the range of variability and potential sources of genre awareness among undergraduates who had not received explicit teaching about genre awareness. It presents students' explicit understanding of why particular genre conventions are followed in a particular context by examining what they could tell about learning the advanced lab report in writing-in-the-major courses in either Zoology or Civil Engineering. Research data includes surveys of all students in three courses (n=112), interviews with a subset in each course (n= 24) and with all instructors (n=7), samples of graded student lab reports, and classroom observations.

Overall, few study participants demonstrated genre awareness as defined by Devitt. Students showed limited awareness of the rhetorical purposes of the advanced lab report and even less awareness of the values and beliefs embedded in its discourse conventions. Disciplinary identification and mentoring experiences were found to be factors that might contribute to the development of genre awareness. Unexpected findings were that some insecure writers showed relatively high overall genre awareness, while some confident writers showed relatively low genre awareness.

Further research is needed to refine an assessment instrument that could be readily used by other researchers. However, the instrument for assessing genre awareness that was developed for this project generated rich observations of student perspectives about learning to perform a new genre. The data illustrated some of the problems that advocates of explicit teaching of genre awareness seek to address. In particular, this study suggests that lack of genre awareness may contribute to the development of disciplinary prejudice and, as a result, reduce possibilities for effective collaboration across disciplinary borders.

CHAPTER I

GENRE AWARENESS: A GOAL OF NEW WRITING PEDAGOGIES

Critics of the first year writing course (FYC) argue that the "general academic discourse" it often purports to teach does not exist (Beaufort; Carroll; Crowley; Connors; Downs and Wardle; Russell; Petraglia; Smit). They argue that research and theory in rhetoric and composition show that writing is a complex, socially-situated activity, and therefore the criteria for evaluating the effectiveness of any piece of writing depends on its content and social context. The situated nature of writing explains the impossibility of teaching students to write effectively "once and for all" in one writing course or in even a series of courses. Wardle points out the inherent contradiction between presenting writing as a single, stable skill and understanding writing as always situated in particular contexts:

> Despite the fact that much recent research demonstrates just how different writing is in different disciplines and just how differently writing is used across the university, FYC teachers primarily working in English departments are being asked to prepare students for the varied and complex ways the students will use writing over the next four years. Thus we have a situation in which our disciplinary research suggests that our first official disciplinary focus for FYC is difficult—if not impossible—to achieve. ("Can" par 1)

Smit carries this idea further, calling for a radical restructuring of college writing instruction:

> The best way to promote a broad-based ability to write is to arrange for novice writers to learn the genres of the discourse communities they wish to join as they become members of that community... As a result I believe that writing instruction should be not the primary responsibility of English

> Departments and writing programs; rather, writing instruction should be the responsibility of all the various disciplines of the university. (12)

In addition, by perpetuating the myth of universal standards for "good writing," the first year writing course can inadvertently set students up for failure or at least frustration when they enter new writing contexts. Composition scholars have observed that under the guise of "general academic discourse," first year writing courses may actually teach genres common to English Studies or even genres used only in first year writing (Beaufort; Carroll; Coe). The unacknowledged teaching of the discourse of English Studies in first year composition causes problems for students when they move into other disciplines, particularly those outside the humanities (Beaufort; Johns). Students may be surprised to find that the writing standards rewarded in first year composition are not valued elsewhere. Also, as Christie has argued, if the disciplinary source of the discourse is not identified by the teacher (or if it is labeled "universal"), "it simply becomes part of the hidden curriculum of schooling" which privileges some students and excludes others (qtd. in Devitt 203).

These criticisms may not apply equally to all college writing programs because some include more than a general first year writing course. In fact, instead of first year writing courses based in English departments, some institutions offer topical seminars taught by disciplinary faculty. Monroe has described such a program at Cornell University. Like Smit, Monroe argues that "The most philosophically consistent approach to teaching writing is thus to embed it from the outset as integrally as possible in the work of the disciplines" (5). In a more common approach, other institutions provide both general writing course(s) and disciplinary writing instruction. These "two-tiered" writing programs require undergraduates to enroll in a general first year writing course or courses

followed by upper division writing intensive or "writing-in-the-major" course(s) to ensure that students learn disciplinary writing from disciplinary experts.

Unfortunately, while the first year "academic discourse" curriculum is vulnerable to criticism, the writing in the disciplines approach is not without weaknesses either (Beaufort; Dias). One problem is that disciplinary faculty may not be prepared to provide writing instruction. As Russell has argued, although these experts may know how to write well according to the conventions of their disciplines, they may not be able to explain to someone else how to do it (Writing 17). A focus on writing in the disciplines also entails the problem of compartmentalized learning. Granted, writing is always embedded in a specific context. But if writing *instruction* also is always embedded in a specific disciplinary context, then each discipline, or even each course, becomes a self-contained island of writing practices. In this model, as students move between disciplines or take general education courses, they must overcome a steep learning curve each time without guidance in making the transition from one kind of writing to another. Envisioning different disciplines or courses as disconnected islands contrasts sharply with the goals of general education programs and with the assumptions of a general first year writing course.

Yet, such lack of continuity in writing instruction exists (Beaufort; Carroll; McCarthy). My first-hand observation of the isolation between first year composition and disciplinary writing instruction at one institution prompted this dissertation research project.

Warning! Bridge Out Ahead!

As a Writing Fellow for the Department of Zoology, I agreed to give a presentation about writing advanced lab reports to students in an Animal Physiology course during the first week of classes. I arrived at the lab prepared to review how to analyze a rhetorical situation and how to use "looping" as a strategy for generating ideas for the introduction to the advanced lab report. These were both writing skills I routinely included in my first year composition course, English 401, and I intended to show how they could be applied to writing advanced lab reports. An undergraduate writing center tutor came with me in order to introduce the writing center's services and to encourage students to take advantage of them. Although she had given the same presentation about the writing center in other classes, she admitted to being ill-at-ease in the "foreign" environment of the science laboratory.

The writing center tutor, an English major, spoke first. Relying on the standard script about the writing center's services, she included in her comments the suggestion that writing center staff could help students "brainstorm ideas for their papers" if they were having trouble getting a draft started. The Lab Supervisor, observing the first day's activities, did not interrupt but later asked me to ensure that writing center tutors would not suggest content for student lab reports.

Before I gave my presentation, the lab Teaching Assistant, who had completed his undergraduate work at our institution and who had taught the lab once before, reviewed the syllabus, including specific expectations for lab reports. He began by emphasizing the importance of writing in this writing-intensive class for juniors and seniors. Then he warned the students, "The writing you will do in this class is completely different from what you did in English 401. That was creative writing. This is technical

writing. It is completely different." Taken by surprise, I let his claim pass uncontested and proceeded with my power point slides.

Although the Teaching Assistant's comments surprised me, their substance was consistent with the arguments of composition scholars who say that writing instruction should focus exclusively on writing in the disciplines (Monroe; Smit; Freedman; Dias et al). In addition, many of my English department colleagues might agree that what they teach in first year composition is "completely different" from writing advanced lab reports. At a meeting of writing center core staff members, I heard an experienced writing instructor make a comment that paralleled the views of the Zoology Teaching Assistant.

The Core Staff had been discussing how to prepare tutors to work with a particular, unique writing assignment that was bringing droves of students to the writing center. The assignment came from a large lecture class and seemed to be designed to allow for rapid grading. It specified the number of paragraphs students should write, the points to be made in each, and it even gave required wording for some of the sentences. The assignment tended to confuse students and tutors alike because it used familiar words such as "essay" and "thesis," but invested them with idiosyncratic meanings. If a tutor did not understand that the professor had specific, inflexible expectations for this "essay," that tutor could unwittingly give students unhelpful advice. Railing against the highly structured nature of the assignment, one of the core staff, an experienced first year writing instructor, complained, "This isn't even writing! It's like a lab report where students just fill in the blanks." To him, a lab report did not count as "writing." Clearly, he did not perceive the composition classes he taught as having much to do with the writing required in a Zoology lab.

On reflection, I have to acknowledge that the Zoology Teaching Assistant's comments sprang from his own experience as an undergraduate in both English 401 and

Zoology 626 (Animal Physiology). Indeed, the writing assignments in English 401 were quite different from the advanced lab report. But is the challenge faced by writers in each course "completely different?" When I first heard the Zoology Teaching Assistant make that claim, I wondered how the students interpreted his warning. How could they know how to write in "a completely different" way? What I observed throughout the semester was student frustration as they figured out "what the teacher wanted" through trial and error, an experience that has also been documented by writing researchers in other settings (Carroll; Beaufort; McCarthy). However, this approach is not inevitable. Increasing student confidence and success in new writing situations by providing transferable knowledge about writing is one of the goals of new pedagogies that focus on enhancing what a student knows about writing, rather than on how to produce specific text types.

New Writing Pedagogies that Claim to Teach for Transfer

An array of approaches to teaching writing has emerged as a result of understanding writing as a socially situated act and accepting that there is no universal "good writing" that can be learned once and for and then applied in any setting. The writing-in-the-disciplines model promoted by both Smit and Monroe, and the apprenticeship model advocated by Freedman reject general writing courses in favor of embedding writing instruction within disciplinary or vocational learning.

In contrast, the English for Academic Purposes and English for Specific Purposes pedagogies, and especially the Australian, genre-based writing pedagogies that rely on Halliday's theory of Systemic Functional Linguistics highlight the need for highly specialized writing instruction. These pedagogies were designed to make disciplinary

content knowledge more accessible to students from different cultural backgrounds through explicit teaching of generic patterns of language use. In all of these approaches, writing instruction is limited to specific contexts. Yet in other approaches, the situated nature of writing does not necessarily entail situated writing instruction. These other pedagogies are based on the belief that a general writing course focused on teaching students *about* the situated nature of writing can equip students with writing skills that can be applied in new situations.

Four recently proposed pedagogies, though differing in content, share a common goal of preparing students to learn about and negotiate new genres and new contexts for writing. Devitt, Reiff and Bawarshi have published a writing textbook that teaches genre analysis as a means of gaining strategies for writing in any situation. Johns describes a search for an approach to writing instruction that will help students develop "rhetorical flexibility and genre awareness." She concludes that the best approach is an interdisciplinary learning communities model in which students use ethnography to study, analyze, practice, and reflect on different genres or writing situations. Beaufort's approach to writing instruction focuses on discourse community theory, which she posits as the basis for a five-part model of writing expertise. She argues that writing curricula should consist of sequential courses based on this model in order to aid transfer of learning for writers (149). In the most recently proposed pedagogy, Downs and Wardle suggest that using the research literature of writing studies to teach students about what writing is and what is does benefits students more than futile attempts to teach them "how to write in college" (553).

In addition to sharing the goal of teaching for transfer, all four of these research-based pedagogies make a place for a first year college writing course without invoking "general academic discourse" or universal standards for "good writing." In every case, dissatisfaction with prevalent first year writing pedagogies motivated the search for new ones. In fact, the scholars who proposed these pedagogies argue that current curriculum contradicts widely accepted composition theory and research. They maintain that new approaches to first year writing instruction are needed to end the transmission of misperceptions about the nature of writing, misperceptions that lead to student frustration. These four approaches also share the purpose of applying theory to practice, though only Devitt and Johns name this as an explicit impetus for their work. Both Beaufort and Downs and Wardle rely on theory and research, but their work was prompted primarily by perceived deficiencies in current writing pedagogy.

Devitt's Pedagogy

In Writing Genres, Devitt makes a case for teaching the knowledge and skills genre theory suggests students need. Rather than propose a particular pedagogical strategy,[1] she explains what effective pedagogical strategies need to do (200). In Devitt's view, first year writing instruction should equip students to negotiate new writing situations rather than accustom them to learning new genres uncritically. Devitt acknowledges that teaching about genre can devolve into form-focused instruction (e.g. the five-paragraph theme.) To avoid this, she emphasizes keeping format and context united, foregrounding the ideological effects of genres, and explaining both the restrictions and possibilities inherent in a genre (198). Instead of teaching students to

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[1] She has done this elsewhere. See Devitt, Reiff, and Bawarshi.

produce specific text types, such as the researched essay or the letter-to-the-editor as is commonly done in first year composition, Devitt advocates teaching students "to analyze genres, to teach a critical awareness of how genres operate so they can learn new genres they encounter with greater rhetorical and ideological understanding" (194). She also introduces the concept of "genre antecedents" and points out that an important role for first year writing might be to teach new genres which can become useful antecedent genres for students to draw on in future learning (202).

Johns' Pedagogy

Like Devitt, Johns seeks to apply genre theory to writing pedagogy. In addition, she is dissatisfied with current methods of college writing instruction that do not meet the needs of the entering students who need the most support - those who are "naïve about academic languages, texts, and cultures" (238). Her particular objective is to find "a genre-based, social constructivist pedagogy for novice academic classrooms" (237). She finds shortcoming in existing genre-based pedagogies, including Devitt's which Johns says is too difficult for some novice students (243). Yet, like Devitt, Johns rejects approaches that would train first year students to produce particular text types. She argues, "our purpose is to educate for a broad knowledge of academic disciplines, not just train for specific text types - and our principal goals are to enhance genre awareness and rhetorical flexibility" (249). She prefers a pedagogy in which students become academic ethnographers through participating in "interdisciplinary learning communities" (246). She also sees potential in a second approach that would use Carter's contextualized taxonomy of "disciplinary macrogenres" as a framework for a genre-based writing class for academic novices (249).

Beaufort's Pedagogy

Beaufort's motivation for revising writing instruction is to foster transfer of learning and to offer students a coherent sequence of writing instruction across all four years of college. She bases her proposal on a theoretical model of writing expertise rather than on genre theory. She agrees with Devitt and with Johns that students need to recognize the social context of writing, but she believes the concept of discourse community encompasses the social context more precisely than the concept of genre does (143). For Beaufort, writing begins and ends in discourse community, which she uses as the "overarching concept" in her model of writing expertise (18). Her model presents the four related knowledge domains of content, process, rhetoric, and genre as overlapping circles within the all-encompassing circle of discourse community. She argues that transfer of learning can occur when students recognize that learning to write in new situations involves developing context-specific knowledge within each of the five knowledge domains. The model serves as "mental schema or heuristic with which to organize knowledge and aid problem solving and gaining new knowledge in new situations" (17). She also sees the model as a theoretical lens that is useful for designing curriculum, assessing writing development, and helping students with specific problems (142).

Downs and Wardle's Pedagogy

Downs and Wardle's pedagogical proposal focuses on first year composition, which they re-envision as an introduction to the study of writing. They argue that dominant "academic discourse" and "cultural studies" pedagogies do not acknowledge and use composition scholarship and do not provide students with an accurate

understanding of what writing is and what it does. Their new approach is designed to "resist and alter students' misconceptions about writing" (559), which include beliefs such as writing is "a mysterious talent" (560), writing is "merely drafting a paper" (563), and "content is separable from writing" (577). Like Beaufort, Downs and Wardle believe that students should learn to see writing as always existing within the knowledge framework of a discourse community. Their proposed pedagogy is explicit about the situatedness of writing and the limitations of what one writing course can do. "Students are taught that writing is conventional and context-specific rather than governed by universal rules" (559). Downs and Wardle imply that this awareness will transfer, enabling students to enter new writing situations prepared to "pay close attention to" the expectations of the new discourse community (559).

Genre Awareness As Learning How to Learn

Though there are differences in the four proposed pedagogies, all seek to reform college writing programs by dislodging misperceptions about writing, particularly what Rose, Russell, and others have labeled the "myth of transience," i.e. the idea that "poor student writing" is a problem that can be solved once and for all by an effective course in general writing skills (Russell 7). The common innovation of all four pedagogies is, in Downs and Wardle's words, to shift from "teaching 'how to write in college' to teaching about writing" (553). All suggest that explicit teaching about writing will facilitate transfer of learning. Recurring themes are equipping students with learning tools and preparing students to be flexible writers who are "educated to cope with an unpredictable future" rather than trained to produce specific kinds of texts (Johns 239). Devitt, Johns, and Beaufort specifically argue that in order to teach for transfer, writing teachers must

provide students with "a mental schema" (Johns, Beaufort) or "a critical awareness" (Devitt) for learning to write in the situations they will encounter in the future. This dissertation investigates one aspect of the "mental schema" or "critical awareness" that is central to these proposed pedagogies, which I will represent with Devitt's term "genre awareness."

Longitudinal studies of student writing development in college reinforce the potential importance of genre awareness. In Carroll's study of student writers across four years of college, she observes that students need rhetorical flexibility, noting that the first step of writing development is for students to "abandon their 'normal' ways of writing to adjust to the demands of a new environment and new roles" (47). She also suggests that students need what she labels as "metacognitive awareness" – not just the ability to write one kind of paper, but explicit knowledge of the processes involved in writing the paper and "how they might be applied in new settings"(25). This "metacognitive awareness" is similar to Devitt's notion of genre awareness.

Sternglass's research also underscores the value of this kind of metacognitive awareness. Like Carroll, she argues that students develop as writers when they encounter situations that cause them to examine and change their writing practices. Based on her longitudinal study of undergraduate writers moving from remedial writing classes into upper division courses in their majors, Sternglass contends that metacognitive awareness of the role of writing in learning "improves students' abilities to use writing effectively for diverse purposes" (59). She cites Flower's support for the importance of metacognitive awareness, particularly regarding the way it allows students to negotiate new writing situations and to recognize the power structures inherent in the "larger circle

of social and cultural assumptions" that surround every opportunity for rhetorical action (qtd.in Sternglass 29).

My own experience with student writers in the advanced Zoology lab course, which I began to describe in the opening of this chapter, points to the positive impact explicit teaching of genre awareness might make. I had drawn on my knowledge of composition pedagogy and writing in the sciences when I prepared the presentation on writing advanced lab reports, but I failed to direct student attention to the "larger circle of social and cultural assumptions" inherent in their new writing situation. The writing tips and strategies I provided were of limited help to students, as the following narrative illustrates.

Building Bridges

As I projected my slides on the Zoology lab wall that early September afternoon, I believed that an invention heuristic and the rhetorical analysis skills I had taught in English 401 would be useful to science students writing advanced lab reports. My presentation also included specific lab report writing strategies (e.g. begin with the results section and write the introduction last) and tips (graphs must have explanatory legends and are labeled at the bottom; tables are labeled at the top) gleaned from science writing handbooks and conversations with the Lab Supervisor. Yet while I spoke, I sensed little more than polite attention from the students.

During the next few weeks, lab observations and individual interviews gave me a chance to find out what, if anything, students might have taken away from my presentation. I discovered that some students had written down and even followed my advice about the order of writing the advanced lab report. On the other hand, no one ever mentioned looping or thinking about purpose or audience as they wrote the reports.

However, the most surprising finding concerned my instructions about how to label tables and graphs. Although I had emphasized this point because I knew it was a pet peeve of the Lab Supervisor, students seemed to have missed it entirely. On their first two lab reports, most students lost what seemed to them to be an excessive number of points (up to 2 out of 20) because they failed to label their graphs and tables adequately and to include appropriate content. They were frustrated that they could lose these points even if the time-consuming graphs themselves were perfect. Ironically, several of them complained bitterly to me during interviews, "No one ever told us we had to do it this way." I never reminded anyone that I had warned them about it on the first day of class.

Assuming my delivery was adequate and students were physically capable of paying attention, a number of other reasons might explain why students missed my advice about labeling tables and graphs. Perhaps students didn't listen to me, an emissary from the English Department, because of the Teaching Assistant's dismissive comment about English 401. Perhaps the timing was wrong - students may only be receptive to specific advice about writing lab reports when they are in the midst of that process. But I think that an equally likely reason has to do with a crucial aspect of the particular context for writing that neither I nor the students recognized on that first day:

The graders' expectations for labeling graphs and tables in these reports were different from the requirements of lower-level science classes; they based on the conventions of professional research journals. Because these students had successfully labeled tables and graphs in more rudimentary lab reports, my advice may have seemed unnecessary, so they didn't listen closely. Most importantly, because I did not realize that the conventions of the advanced lab report were a change from what the students were

used to doing, I did not make the novelty explicit. I only described what they should do and warned them about losing points if they failed to do it. I focused on how to perform the conventions, not on the reasons behind them. Had I instead pointed out that the natural tendency to follow past practices would be a pitfall and explained why the format of these reports was different, the students might have heard me with greater interest, comprehension, and retention.

Explaining why the expectations in the upper level class were different would have highlighted the contrasting purposes of the two writing tasks. In introductory labs, students write to demonstrate what they have learned, and the grader looks at the graphs primarily to check if they have been constructed properly. Writing in the advanced course, on the other hand, puts students in the role of creating knowledge and publishing a research report. Graphs in professional journals must present results clearly and completely for readers who might not take time to read the full text of the article. Had I explained this, I might have helped students to realize that writing an advanced lab report is not about following a set of arbitrary rules devised by each instructor. Instead, they might have understood that context and purpose shape the format of the report, and that to write effectively, they must be alert to the beliefs, practices, and purposes of the writing environment. Such a discussion might have fostered a readiness to analyze the social context when faced with a new writing task. In other words, the discussion might have fostered genre awareness.

Theoretical Foundation of Genre Awareness

Approaches to Understanding Genre

The concept of genre awareness is rooted in contemporary understandings of genre theory. Drawing from Bakhtin's construct of speech genres and Miller's explanation of genre as social action ("typified rhetorical actions based in recurrent situations" (159)), genre theorists such as Martin, Berkenkotter and Huckin, Swales, Devitt, Bawarshi, Freedman, Russell, and Bazerman have developed genre theory so that it is far removed from the common idea of genre as a way to classify books and movies. Instead, genre is understood as a way to talk about how patterns of language use mutually influence patterns of social behavior. Paraphrasing Miller's formulation, Bazerman explains, "genre is a socially recognized, repeated strategy for achieving similar goals in situations socially perceived as being similar... A genre is a social construct that regularizes communication, interaction, and relations" (62).

Devitt provides a thorough synthesis and elaboration of genre theory that supports her proposal for teaching genre awareness. She traces the complex, interdisciplinary roots of current genre theory, identifying contributions from literature, linguistics, rhetoric and composition (2). Johns ("Introduction") and Freedman also preface discussions of genre-based pedagogy with brief outlines of the development of contemporary genre theory. Freedman divides genre scholarship geographically between North America and Australia, labeling the latter as "the 'Sydney School'" (191). This move isolates the linguistically-based Sydney School from other work in genre theory, which is ironic since Freedman identifies herself with the North American school, yet draws heavily on linguistic scholarship in her arguments.

Like Devitt, Johns presents a more complex categorization of approaches to genre theory than Freedman does ("Introduction"). Rather than geography, she uses "the intellectual tensions inherent in the conceptualization and application of the term genre" to distinguish five overlapping "theoretical camps" ("Introduction" 4). Building on the work of Hyon, she places the five camps on a continuum, with the "Sydney School" on one end and the "New Rhetoric" on the other. These endpoints reveal the primary "intellectual tension" that separates the different approaches, with the Sydney School conceptualizing genre primarily through the language and text structure of its exemplars and the New Rhetoric group emphasizing genre's social context. Other tensions that inform John's groupings of approaches to genre theory include how a theory conceptualizes the teachability and stability of genre (i.e. does it conceive of genre as static enough to be taught in a classroom setting?) and how a theory relates genre (and the teaching of genre) to social power and authority. The mid-point of John's continuum is held by the pragmatic and eclectic English for Specific Purposes (ESP) approach. Between the ESP midpoint and each end of the continuum, Johns inserts a group of "related approaches."

These five camps do not include literary scholarship as Devitt does, but that may be because Johns is not tracing the development of contemporary genre theory as much as she is distinguishing strands of genre theory that are currently influencing writing pedagogy. Her categories reflect the complexity of approaches to genre theory that exist within the field of applied linguistics.[2] In fact, applied linguists such as Martin, Swales,

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[2] In addition to theoretical work on genre, the applied linguistics literature offers an abundance of valuable research on writing instruction. See studies by Bhatia, Braine, Dudley-Evans, Flowerdew, Harwood, Hyland, Hyon, Paltridge, Samraj, Swales.

Hyon, and Bhatia have produced a wealth of genre scholarship because the problem of tacit assumptions in writing instruction—Christie's "hidden curriculum"—is felt more acutely by students who are learning to write in a new language or culture.

Guiding Concepts About Genre

The concept of genre awareness used in this dissertation relies primarily on a rhetorical rather than a literary or linguistic theory of genre. Rhetorical genre theory, which Freedman would identify with the North American school and Johns with the New Rhetoric camp, emphasizes the social context of genre rather than the function of language in genre (i.e. "how language works to mean" (Rothery 120)). This focus on social context differentiates it from approaches based on Systemic Functional Linguistics, such as the "Sydney School" and ESP. The importance of social context in rhetorical genre theory also sets it apart from the long-standing notion of genre as static form or text type.

Unlike genre classification systems defined by literary critics or other scholars, rhetorical genres are defined by users – "by the people who participate in genres and make the forms meaningful" (Devitt 3). Johns, working against the notion of genre as text type, explains that genres do not reside in texts, but in the minds of the people who use them. She identifies genres as "socio-cognitive schemas for appropriate textual approaches to rhetorical problems… schemas that often have to be reformulated as writers produces texts for the demands of specific contexts" ("Genre" 239). Reformulating genres can lead to change over time, which contrasts with the idea of genre as static and unchanging.

Schryer clarifies that the dynamic aspect of genres is due to the fact that "all genres have a complex set of relationships with past texts and with other present texts;[3] genres come from somewhere and are always transforming into something else" (108). Schryer also points out that a genre "coordinates work" (109) and is inherently ideological, embodying "the unexamined or tacit way of performing some social action" (108). Bawarshi adds, "to write is to position oneself within genres" (14). He examines how a writer's agency interacts with genre, showing that the writer participates in agency, but is not the sole agent (50).

Definition of Genre Used in This Project

The meaning of the term "genre" is a difficult to specify because of its abstract nature and because it has been used in different ways in the past and is conceived of differently by different theorists at the present time. Rooted in rhetorical genre theory, my use of the term depends mainly on the definitions of three theorists: Bazerman, Devitt, and Bawarshi. I use Devitt's words to summarize the fundamental ideas about genre that many theorists agree on, specifically that genre is typified social action associated in a recurrent situation, and that the "recurrent situation" is itself social a construction (25). Secondly, my conception of the term entails the fact that genre and social situation mutually influence each other. In describing the social nature of genre, Devitt highlights the ideological function of genres, functions that are accomplished when students write. "A genre reflects, constructs, and reinforces the values, epistemology, and power

[3] This is similar to the way Devitt has expanded the definition of genre to include the contexts of culture and of other genres in addition to the context of situation (31).

relationships of the group from which it developed" (64). This function of genre is crucial for understanding the nature of and importance of the concept of genre awareness.

In Bazerman's early work, I find a helpful articulation of genre's abstract nature. His words help explain how genre is more than a recurrent form or text type, even though genres tend to have recognizable format characteristics. "Genre, then, is not simply a linguistic category defined by a structural arrangement of textual features. Genre is a sociopsychological category which we use to recognize and construct typified actions within typified situations. It is a way of creating order in the ever-fluid symbolic world" ("Shaping" 319).

Finally, I turn to a definition of genre by Bawarshi to capture an understanding of genre from the perspective of a writer. Genres are "typified sites of action that at once elicit and reproduce recurrent situations by organizing and generating the desires, activities, subjectivities, and relations that take place within these situations" (107). The idea of genre as a place, a "site of action," comes through in this definition. Elsewhere Bawarshi describes genre as a habitat or ecosystem for using language (111). He uses these metaphors to get at the idea that genre is "a way of being in the world" (111). His focus is on the action within a context from the writer's perspective.

In short, what I mean by the term "genre" is a pattern of language use that has developed from a social context, and that likewise influences that social context. The word with the greatest potential to mislead in that statement is "pattern." I do not want to imply that genre is a fixed text type. Instead, I conceive of a genre as action, as typified action. The word encompasses not only the text that a person produces, but also the idea that the discursive action mutually constitutes a social context. When discussing genre, I

take care to refer to people *performing* genres rather than *writing* them as a way to distinguish discursive action from text type. Genre is not merely the outcome of an act of writing, but, as Bawarshi articulates, it is also the motive and the environment for generating a written product. I admit to feeling a continual undertow when talking about genre to present it in a way that suggests text type. I wonder if the best approach in my scholarship and teaching might be to avoid using the word as much as possible.

Genre and Learning to Write

The understanding of genre used in this study reveals the complex challenge students face when they encounter a new writing situation. When they must write in a "completely different way" as the Zoology Teaching Assistant admonished, they are doing more than learning the standard format of a lab report. They must learn to use – and perhaps to modify – their existing understanding of lab report conventions to meet the demands of a particular course, instructor, or even to account for differences in each experiment. They need to decide what level of detail is appropriate and choose suitable vocabulary. To write an effective advanced lab report, they must position themselves as scientists and accept, or negotiate, the values expected by the relevant scientific community. In turn, their actions in the lab--they way they see, record and think about their data--will be influenced by their experience producing and using advanced lab reports.

What Is Genre Awareness?

Genre awareness is explicit knowledge about what genres are and how they function. Devitt defines genre awareness in light of her articulation of what knowing genre means. According to Devitt,

> Knowing genre, therefore, means knowing such rhetorical aspects as appropriate subject matter, level of detail, tone, and approach as well as the expected layout and organization. Miller concentrates on what genre reveals about purpose, object, and motive, and she concludes that 'what we learn when we learn a genre is not just a pattern of forms or even a method of achieving our own ends. We learn, more importantly, what ends we may have' (Miller 165). Knowing the genre means not only, or even most of all, knowing how to conform to generic conventions but, more importantly, knowing one way of responding appropriately to a given situation. (16)

Devitt proceeds to define genre awareness as "a critical consciousness of both rhetorical purposes and ideological effects of generic forms" (192). As I will elaborate in the rest of this dissertation, Devitt's succinct definition guides my assessment of genre awareness.

Students who have fully developed such a "critical consciousness" would have an explicit understanding that good writing results from a complex, mutual interaction of writerly intention, genre, and social situation. Devitt believes that teaching genre awareness has the "potential for giving students more control over language" (211). She explains that genre awareness encourages students "to see purposes, values, beliefs, assumptions and ways of seeing the world" that are embedded in genre (211). Devitt also contends that genre awareness will enable writers to learn new genres "with greater rhetorical understanding and with more conscious acceptance of or resistance to the genres' ideologies" (192). Genre awareness is knowledge that leads to a way of seeing that is independent of any one genre or social context. It is the recognition that genres are responsive to and shapers of the social contexts in which they function.

The nature of genre awareness can be further understood through what it enables students to do. A fundamental skill supported by genre awareness is the ability to

recognize, analyze and interpret the implications of genres. In their first-year composition textbook, Devitt, Reiff, and Bawarshi specify key actions supported genre awareness under the heading "Guidelines for Analyzing Genres" (93-95). The guidelines instruct students to collect examples of a genre, and then to do research to "describe the situation in which the genre is used" (93). Students must also "identify and describe patterns in the genre's features," including typical content, rhetorical appeals, structure, format, and diction (94). Finally, students are asked to consider the implications of the patterns they have observed. The process of genre analysis leads students to consider rhetorical, material, social, and ideological contributors to a genre.

Devitt, Reiff, and Bawarshi explain that with knowledge of genres (i.e. genre awareness), "writing becomes choosing, not guessing" (95). Rather than "guessing about how to begin writing or what to write about," students can analyze a genre and then choose how to use the rhetorical elements available within it (95). The authors imply that when students learn how to analyze a genre, they gain genre awareness – the knowledge of what questions to ask when faced with a new writing situation. Johns observed this result when teaching students in an interdisciplinary learning community to analyze the genres of another college course. She reports the following student feedback: "This class helped me think about all my classes. Now, I know what questions to ask" ("Genre" 248).

The Question of Explicit Teaching

Genre Awareness is NOT Genre Acquisition

Genre awareness differs from genre acquisition, which refers to learning how to produce a particular text type. Genre awareness involves knowing more than just the rules and guidelines to follow to produce a "correct" version of a particular kind of

document. For Devitt, genre awareness, not genre acquisition, is the preferable goal. She points out that even if genres could be taught so that students acquired them perfectly, there is no way to teach all the genres students will need in the future (205).

The various "Sydney School" genre pedagogies, with their focus on language and text structure, have been criticized for promoting uncritical genre acquisition. Although in my opinion such criticism misses the fundamental purpose of the Australian genre-based pedagogies, the criticism reflects a very real risk that teaching about genre can easily become focused on form. As Herrington and Moran point out, even writing textbooks that "attempt to construe genre as rhetorical action too often slide toward a representation of genre as decontextualized form" (15). Devitt believes that even though teaching for genre awareness may appear to be similar to teaching for genre acquisition, the risks of stale prescriptivism can be avoided by focusing on the goals of genre awareness: "to understand the intricate connections between context and form, to perceive potential ideological effects of genres, and to discern both constraints and choices that genres make possible" (198).

Support for Explicit Teaching of Genre Awareness

Both Devitt and Johns advocate teaching of genre awareness. Beaufort does not use the term "genre awareness," but she promotes a similar concept. Beaufort contends that an awareness of the knowledge and skill domains that must be mastered in a new writing situation (i.e. her five-part model of writing expertise) gives a writer "intellectual tools and frameworks ...to adapt to a variety of writing situations" (15). Likewise,

Downs and Wardle do not discuss genre awareness[4] but have a similar focus on helping students understand "how writing works" (567). In addition, they point out that learning transfer is facilitated by "self-reflection, explicit abstraction of principles, and alertness to one's context" (576).

The four pedagogies I have identified as valuing the development of genre awareness indicate that explicit instruction about the nature of writing should help students develop it. The methods proposed for teaching genre awareness include analysis of genre examples, reflective assignments, ethnography of discourse communities, guided practice producing a range of genres, and studying research about writing. Yet the questions remain, do such methods actually increase student genre awareness? And, does genre awareness in fact help students negotiate new writing situations effectively?

Criticism of Explicit Teaching of Genre Acquisition

Explicit teaching of genre *acquisition* (not genre *awareness*) has been criticized by scholars such as Freedman and Dias, et al.. Freedman points to research showing that writers can learn new genres without explicit instruction (196). Further, she explains that because writing is always complexly embedded in a specific activity, it can only be learned through use, that is, through immersion in an activity. Her point is that direct instruction cannot provide enough information to adequately explain all that a writer needs to know to perform a genre, but that people can infer and tacitly internalize the necessary knowledge through exposure to the activity. In other words, they can learn to perform a genre expertly without being able to explain all that they know about it. Freedman argues, "Acquisition itself is achieved through the intuition of rules at levels

[4] Wardle has noted elsewhere that her writing studies pedagogy grew out of genre theory and a study based on genre theory and activity theory ("Re: writing" par. 1).

below the conscious" (199). In fact, Freedman warns that explicit teaching could be harmful because it may interrupt the tacit acquisition process that occurs through immersion (199).

The Need for Research About Genre Awareness

Could Freedman's arguments about genre acquisition be applied to teaching genre awareness as well? Devitt does not think so. She points out that if a genre can only be learned by doing – by immersion – then it would be impossible for people to ever "learn a genre critically or knowingly" (196). Freedman, in contrast, maintains that critical awareness of a genre's ideology is only possible for those who have learned to perform it (qtd. in Devitt 196). Devitt protests, contending that "by the time one has learned to perform a genre, one is already inducted into its ideology" (196). Devitt argues for explicit teaching of genre awareness in order to prepare students to look for the embedded ideology when they first encounter a new genre. "Once they are full participants in the genre, resistance becomes more difficult (some say futile) and choices become less visible (some say invisible)" (196). Further research is needed to advance this debate as well as to test the claims of recently proposed writing pedagogies. A method for assessing genre awareness would contribute to answering such questions.

In response to this research need, I designed a study to investigate the range of variability and potential sources of genre awareness among students and their instructors in Zoology and Civil Engineering, none of whom had received explicit teaching about genre awareness. My attempt to develop and field test a method for assessing genre awareness is a key contribution of this project. The following six chapters describe the study methodology, demonstrate an approach for assessing genre awareness, present the

assessment of participant genre awareness, evaluate the assessment instrument, and compare my observations of participants' disciplinary writing experience with the work of other researchers and theorists.

Chapter Two introduces a method for assessing the theoretical construct of genre awareness. Although genre awareness is a much-discussed concept and it is presumed to be beneficial to students, no previous attempts have been made to assess it empirically. This chapter describes in detail the data collection and analysis methods used in this initial effort to do so. The chapter also presents the questions that guided this research project and describes the research methodology. Rather than gathering in-depth information about one or a few students across a variety of classes, this qualitative study collected a limited amount of information from a larger number of students in three similar courses. The data consisted of two surveys of all students in three courses, interviews with a subset in each course and with all instructors, samples of graded student lab reports, and classroom observations. Chapter Two discusses the reasons for choosing to study these departments and courses, and describes the study participants, the data collection instruments, and methods of analysis.

Chapters Three and Four present the data collected as the basis of the assessment of student genre awareness. Using Devitt's definition of genre awareness, I describe students' "critical consciousness of rhetorical purposes" of advanced lab report conventions in Chapter Three, and their "critical consciousness of ideological effects" in Chapter Four. The chapters include summaries of survey responses but focus primarily on interview excerpts. My interpretations of students' descriptions of their experiences with the advanced lab report illustrate the inherent subtlety and complexity of attempting

to assess genre awareness. Chapters Three and Four show that genre awareness is not a monolithic quality that students have or don't have, but rather that it comprises a rich palette of understandings of the interaction between genre and social context. In these chapters, I describe the array of genre awareness demonstrated by study participants

Chapter Five synthesizes the findings presented in Chapters Three and Four into an assessment of the overall genre awareness of individual students. The rankings of all interviewees across six indicators of genre awareness are used to identify students on the highest and lowest ends of a genre awareness continuum. The experiences of these two groups of students are then studied to discern potential contributors to the development of genre awareness.

Chapter Six presents student experiences of learning to perform the advanced lab report that illustrate why some scholars are advocating new pedagogies that promote genre awareness. Four specific reasons for teaching for genre awareness that have been mentioned by the Beaufort, Devitt, Johns, or Downs and Wardle are discussed. These include transfer of learning, rhetorical flexibility, freedom to make discursive choices within the constraints of a genre, and preparation to resist or knowingly accept the ideology embedded in a genre.

Chapter Seven evaluates the method for assessing the theoretical construct of genre awareness that was field-tested in this study. I argue that further research is needed to refine a tool for assessing genre awareness, and that an effective survey instrument would be especially valuable. In Chapter Seven I also reflect on the research questions that guided the project. I summarize what my assessment methods showed about the range of variability of genre awareness among study participants and suggest that

disciplinary identification and mentoring may be two factors that contribute to the development of genre awareness. The dissertation concludes by considering directions for future research based on this project.

CHAPTER II

ASSESSING DEVITT'S CONSTRUCT OF GENRE AWARENESS

To explore the need for explicit teaching genre awareness, I designed a study that assessed the range of variability of genre awareness among students who had not received the kind of explicit instruction Devitt and others have advocated. My study focused on one primary research question and two subsidiary ones. The main question was (1) What is the range of variability of genre awareness among students in three writing-in-the-major courses? Following the primary question, I also considered (2) What factors may have helped students gain genre awareness that I observed? and (3) How might the experiences of study participants illuminate claims that genre awareness will benefit writers learning to perform a new genre? Throughout this study, I relied on Devitt's definition of genre awareness as "a critical consciousness of both rhetorical purposes and ideological effects of generic forms" (192).

Rationale for Studying the Advanced Lab Report

Advocates of explicit teaching of genre awareness argue that it will prepare students respond effectively to new writing situations. For this reason, I sought a research context in which students would be asked to perform a new genre. This is the type of situation in which genre awareness as the ability to "learn how to learn" would be most useful. Students who had developed genre awareness would be most likely to

demonstrate it in such a context. Similarly, students with little or no genre awareness might exhibit problems when faced with learning a new genre. The advanced lab report assignment in upper-level lab courses in Zoology and Civil Engineering provided an appropriate research opportunity.

Although some aspects of the advanced lab report's format were similar to reports used in introductory science classes, the social context for the advanced lab report extended beyond the classroom. While the introductory report functioned to demonstrate student learning within the social context of the classroom, the advanced lab report served an additional purpose—to share knowledge—and was positioned within the social context of the professional workplace as well as the classroom. For science and engineering students entering their first writing-in-the-major course, the advanced lab report constituted a new genre, distinct from the lab report genre performed in introductory science classes.

The advanced lab report was also a convenient choice for a study of student genre awareness because it exhibited readily observed rhetorical purposes and employed easily recognized conventions that reflected key ideological assumptions associated with science. The rhetorical and ideological nature of research reports written by scientists (Bazerman; Campbell; Fahnestock; Moskovitz & Kellogg; Myers; Prelli, Prior) and engineers (Herrington; Winsor) has been well-established. Likewise, the rhetorical moves within typical lab report (e.g. the Introduction, Methods, Results, Discussion (IMRD) format) have been studied (Swales; Hyland; Tardy). As a result, my assessment of students' "critical consciousness of the ideological effects and rhetorical purposes" of lab report conventions could be based on more than my own familiarity with it. I could

compare what students might say about the genre to other scholars' descriptions of its key rhetorical purposes and ideological underpinnings.

Study Design

While other studies of students learning to write in the disciplines have tended to focus on the quality of students' performance of particular genres or on the interaction between genre acquisition in the workplace and the development of disciplinary identity (Anson and Forsberg; Berkenkotter and Huckin; Blakeslee; Cox; Dias, Freedman, and Medway; Prior), my purpose for this project was different. For one thing, I wanted to focus on undergraduate education because the new writing pedagogies that promoted the teaching of genre awareness were designed for undergraduates. Secondly, rather than looking at students' performance of particular disciplinary genres, my goal was to study genre awareness and how it might help students analyze and learn to perform new genres.

My focus was on what students could tell me about the socially situated nature of writing and, in particular, on what they might say about the interaction between social context and the conventions of the advanced lab report genre. Although empirical research necessarily focuses on one or more specific contexts, my goal was not to characterize those contexts as much as to find out whether students would refer to the influence of the social context when explaining the conventions of the genre they were learning. I was not interested in what they knew about the social context, but instead in whether they would expect that context to influence their performance of the genre. The accuracy and sophistication of their knowledge of the genre's social context was less relevant to my research questions than whether students realized that the genre was shaped by the social context.

Because I sought student perspectives about writing, I choose to conduct a naturalistic, qualitative study. Knowing I would be recruiting participants from Zoology and Civil Engineering, I looked to empirical studies of student writing in the disciplines as potential models for the kind of data I might gather. Many of these were case studies that focused on in-depth information about one or a few students over time and across a variety of classes (Beaufort; Chiseri-Strater; Cox; Haas; Herrington; McCarthy; Nelson; Winsor). Case study methodology has many advantages, including the opportunity to document growth and development. However, change over time was not central to my purposes in this project, and I wanted to gather as wide a range of perspectives as I could manage in one semester of data-gathering. So instead of a case study approach, I designed what would be called a cross-sectional or prevalence study in epidemiology. With this approach I collected a smaller amount of information in a limited period of time from a larger number of participants than I would have using a case study design.

The array of data I collected (surveys, interviews, student texts, classroom observations) was similar to the design of Herrington's study of writing in upper level chemical engineering classes. However, unlike Herrington, I did not include think aloud protocols or detailed text analyses because student performance of the genre was not the focus of my research. My interest was not in how students learn *what* the conventions of the advanced lab report are, but rather in whether students learn *why* particular genre conventions prevail. That is, I wanted to probe the depth of students' "critical consciousness of both the rhetorical purposes and ideological effects" embedded in the advanced lab report genre's conventions and practices (Devitt 192).

Measurable Evidence of Genre Awareness

My goal was to assess genre awareness as it had been defined by Devitt. Because no research models existed for assessing genre awareness, I developed an assessment method based on student statements about their writing experiences. I began by extracting potentially measurable kinds of evidence of genre awareness from the "Guidelines for Analyzing Genres" in the textbook Scenes of Writing by Devitt, Bawarshi, and Reiff. I then used these possibilities, summarized in Table 2.1, to create survey and interview questions, and to analyze student responses.

I planned to credit students with having genre awareness if they made two kinds of statements. The first kind was statements that reflected a student's understanding that writing is situated. In other words, if students' words indicated that they recognized to some extent the mutual interaction of social context and genre, I would count it as evidence of genre awareness. Such statements could be elicited by asking students to explain the rationale for salient genre conventions, such as avoiding first person pronoun use. (Other conventions are listed in Table 2.1). Students would demonstrate genre awareness if, *in explaining why* these conventions were used, they referred to reader needs or practices, or to the use or purpose of the report, or to the beliefs/values shared by members of their discipline. In other words, invoking the social context to explain genre conventions would be evidence of genre awareness.

Table 2.1

Potential Kinds of Evidence of Genre Awareness

Students exhibited genre awareness if they made statements...

1. Recognizing interaction of social context and genre. This included explaining genre conventions by referring to
   - reader needs or practices
   - the use or purpose of the report
   - beliefs/values shared by members of their discipline.

   Genre conventions that students were asked to explain included:
   - avoiding first person pronouns
   - citation practices
   - conciseness
   - certainty vs. hedging
   - diction (avoiding colloquial language, recognizing specialized meanings for common words)
   - organization of the report (IMRD)
   - format and labeling of tables and graphs

   Statements such as "writing this way just sounds better or sounds more professional" would indicate limited genre awareness.

2. Reflecting an understanding that there is variability within the genre and/or that genres change over time. This included
   - referring to variations in published papers
   - noting changes over time in the use of first person pronouns in scientific writing

   Describing lab report conventions as a fixed set of rules would indicate limited genre awareness.

I envisioned a second kind of possible evidence of genre awareness to be statements reflecting an understanding that genres permit some degree of variability and that they change over time. For example, students might demonstrate genre awareness by mentioning that different methods of formatting or organization are used in published papers. Or, they might observe that the prohibition against using first person pronouns

seemed to be changing over time. In contrast, describing writing the advanced lab report as following a fixed set of rules would indicate limited genre awareness. As I will explain later in this chapter (see Table 2.13), these initial possibilities for evidence of genre awareness were narrowed to six indicators in my final analysis of the data.

Selection of Research Sites

Because of the widespread use of the lab report across a variety of disciplines, I had a variety of possible research sites to choose from. With guidance from my institution's Writing Program Director, I identified four departments in which leading faculty members had initiated efforts to enhance writing development among their majors: chemistry, civil engineering, physics, and zoology. After interviewing faculty members and reviewing the writing requirements and writing intensive courses for majors in each of these departments, I selected Civil Engineering and Zoology as the most promising research sites. Each of these departments required majors to take an upper level writing course focused on producing multiple lab reports modeled on professional reports in their disciplines. Each department offered at least two writing intensive lab courses which were taken by approximately sixty students in their junior or senior year. In the physics and chemistry departments, on the other hand, the upper level writing intensive courses involved fewer students (ten and fifteen, respectively) and fewer lab reports per course.

Faculty in both Civil Engineering and Zoology emphasized that the success of their graduates depended on writing effectively. Regarding the Civil Engineering Department's decision to require a technical writing course for all majors, the Director of Undergraduate studies said "The faculty and our Industrial Advisory Board are pleased

with our decision to require this course and are strong advocates of what it can mean to our students. Writing is incredibly important to our profession." A graduate of the Civil Engineering Department added:

> Engineers write all the time. The more successful they become, the more writing they have to do... Success translates to salaries. If an engineer can write well, present their ideas well, then they will continue to win jobs, get promotions and bonuses. If an engineer can not write well, then they will always work for others, and the others will make the bigger salaries and bonuses (Bunn).

Similarly, a Zoology professor included the following exhortation about writing in her syllabus "Being able to write well is essential in science, as well as all fields. No matter how great your ideas and work, if you can't communicate them they 'don't exist' to the world." Student writing development was valued in both departments, which led key faculty members to take an interest in my research project.

I also chose the departments of Zoology and Civil Engineering because the students who entered these majors tended to see themselves as "good at math and science" and were often surprised to learn that successful professionals in their chosen fields must write voluminously, proficiently, and persuasively in order to generate income or to obtain financial support for their research. Students in these majors typically spent the first two years of college building core knowledge in math and basic science. Then as juniors and seniors they had to make the transition from learning about science to carrying out activities modeled on professional practice, from responding to questions to posing them, and from finding correct answers to interpreting inconclusive data. Students discovered—some with dismay—that the familiar the school lab report morphed into something much more challenging and much more like a professional report. Upper-level writing intensive lab courses where this discovery happened presented students with a

new writing situation, one in which they could potentially benefit from having an awareness of what genre is and how it functions.

I selected courses in two departments so that my observations about genre awareness would not be overly influenced by the idiosyncrasies of one department. My study was ultimately about learning that is independent of any particular course or department. Genre awareness is conceived of by Johns and others as a portable mental schema that can be developed in one course and then used in any other course across the disciplines. Therefore, any patterns regarding student genre awareness that I observed in two different departments would reveal something about the nature of the development of genre awareness in any department. The similarities and contrasts in student genre awareness between Civil Engineering and Zoology would indicate which factors might transcend departmental culture.

Participant Recruitment

I recruited students in each of the three courses on the first day of lecture or lab for the semester. In every case, the professor or teaching assistants gave me time during a regular class meeting to describe my project and to ask students to participate. After my presentation, I distributed consent letters and Survey 1 to all students in the class, and collected the papers at the end of the meeting. The student participation rate was very strong (93% on Survey 1; 87% on Survey 2). All of the teaching assistants also signed consent forms and agreed to be interviewed.

The social characteristics of all study participants are summarized in Table 2.2. Details of how students participated in the study are shown in Table 2.3.

Table 2.2

Social Characteristics of All Study Participants

	CIE 622 Engineering Materials	ZOOL 626 Animal Physiology	ZOOL 713/813 Animal Behavior
Students enrolled	54	27	40
Survey participants	50	25	37
Gender ratio (m:f)	46 : 4	8 : 17	10 : 27
Age in years (mode, mean, range)	20, 21, 19-29	20, 22, 19-50	21, 21, 19-34
Year in School	44 juniors 4 seniors 1 sophomore 1 graduate	10 juniors 14 seniors 0 sophomore 1 graduate	7 juniors 26 seniors 3 sophomore 1 other
Major	44 Civil 6 Environmental	1 Biochemistry 3 Biology 1 Ecology 1 Marine Biology 19 Zoology	8 Animal Science 5 Biology 2 Ecology 4 Marine Biology 3 Psychology 5 Wildlife Mgmt 6 Zoology 4 Other
Job/Research/Internship in Discipline	31 Yes 19 No	17 Yes 8 No	27 Yes 10 No
Languages Used Regularly	53 English 1 Spanish 1 Polish	27 English None	40 English 1 French 1 Spanish

Table 2.3

Student Participation in Research Project

	CIE 622 Materials	ZOOL 626 Animal Phys.	ZOOL 713/813 Animal Behavior	All
Students Enrolled	54 (50 M; 4 F)	27 (8 M; 19 F)	40 (10 M; 30 F)	121 (68 M; 53 F)
Survey 1 Participants	50 (46 M; 4 F)	25 (8 M; 17 F)	37 (10 M; 27 F)	112 (64 M; 48F)
Survey 2 Participants	46 (42 M; 4 F)	24 (7 M; 17 F)	35 (10 M; 25 F)	105 (59 M; 46 F)
Willing to Provide Graded Lab Reports	42 (40 M; 2 F)	21 (6 M; 15 F)	32 (7 M; 25 F)	95 (53 M; 42 F)
Willing to Interview	35 (32 M; 3 F)	19 (4 M; 15 F)	27 (5 M; 22 F)	81 (41 M; 40 F)
Scheduled an Interview	7 (6 M; 1 F)	9 (2 M; 7 F)	9 (0 M; 9 F)	24* (8 M; 16 F)

*One female interviewee was in both Animal Physiology and Animal Behavior.

Description of Research Sites

The study focused on students in three writing intensive lab courses intended for juniors and seniors: Materials (CIE 622), Animal Behavior (ZOOL 713) and Animal Physiology (ZOOL 626). All three labs were associated with a lecture course taught by a full professor. In Materials and in Animal Behavior, all students in the lecture were required to take the lab, but in Animal Physiology, the lab was optional. All lab sections in the three courses were taught by graduate student teaching assistants (TAs) who were supervised by the professor of the lecture course. In each lab, a new TA was paired with at least one other instructor who had taught the lab before. In Materials, the TAs were

Master of Science students who had recently earned the Bachelor of Science in Civil Engineering at our institution. Two had taken Materials with the same professor in 2004 (three years prior to my study) and one had taken it in 2005. None of the TAs in Zoology had degrees from our institution, and in both Zoology courses one of the TAs was a doctoral student and the other a Master of Science student.

Upper level writing intensive courses in Zoology and Civil Engineering used the lab report assignment for similar purposes, but differed in their disciplinary cultures, student population characteristics, and administration of the assignment. The professional report that was the basis for the assignment differed as well. The lab report in Civil Engineering was modeled on the commercial testing lab report written for a client. Professional testing reports would follow standardized procedures and produce measurements that were compared to expected values. The model in Zoology, on the other hand, was the peer-reviewed research article, which might use novel methods to produce data that had no pre-existing, expected values.

Approaches to Writing Instruction in Three Courses

In all three courses, the TAs were instructed to give ample feedback on the undergraduates' writing. Frequent practice writing the reports was the primary method for learning to perform the genre. The format of the advanced lab report in all three courses followed the standard "Introduction, Materials and Methods, Results, Discussion" (IMRD) model, with some minor variations. An abstract was not required in Animal Behavior, and the testing report in Civil Engineering included additional sections such as a cover letter addressed to a client, a title page, table of contents, a description of apparatus, and extensive appendices.

The syllabus for each course explicitly highlighted writing development as a key goal, and this emphasis was reflected in how the course was graded. In Materials, a required course for all Civil Engineering majors, lab reports counted for 35% of the course grade, and the syllabus noted that a major objective of the course was "to learn how to lead as a project manager in obtaining, analyzing, and developing a technical report based on a laboratory experience." Likewise in Animal Behavior, the reports constituted 75% of the lab grade, which in turn was 50% of the course grade. "Improve your ability to write" was listed as a course goal on the lab syllabus in Animal Behavior. The professor elaborated,

> Why should this be important in a science class? It will help you get a job. Writing helps to stimulate your thought process, and to make your thoughts more organized and clear. Being able to write well is essential in science, as well as all fields. No matter how great your ideas and work, if you can't communicate them they 'don't exist' to the world."

Finally, in Animal Physiology, students were assigned two kinds of lab reports which together accounted for 50% of the lab course grade. The Laboratory Reports Guidelines written by the supervising professor explained that lab reports were required in order to "help you [students] learn to write in a professional manner consistent with the expectations of workers in the discipline." The audience for the reports was specified as "intelligent readers who have not read the lab exercise but know about the general subject. Pretend you are planning to submit your work to the Journal of Physiology for evaluation."

All three courses offered students an opportunity to revise after receiving ample feedback from the TAs. However, students in Animal Physiology and in Materials only had one chance to revise their reports for an improved grade. In both of these courses, the

opportunity was limited to the first lab report of the semester. It was intended to demonstrate the TAs' high expectations and severe grading. The first lab report received a grade along with written comments, and students had two weeks to revise and resubmit for a new grade, which would then be averaged with the first grade to determine the final grade for the report. Implicit in this approach was the assumption that a new genre is learned by trial and error. Professors, TAs, and students all concurred that instructions in the form of lectures, written guidelines, and model papers, though helpful, were not likely to be sufficient to prepare students to write a satisfactory report the first time. Attempting to perform the genre and getting it "torn apart" was frequently mentioned as an effective – and inevitable - way to learn. The Civil Engineering students were warned by their professor on the first day of the Materials class, "Expect red ink. It will be a learning experience...By the time you get out of here you will be able to write a report."

A corollary of the trial and error approach was the belief that repeated practice would lead to improved performance. Students in Animal Physiology wrote six lab reports in a 15-week semester, and students in Materials, working in teams, wrote seven. Even though students in Materials met for lab every other week, the pace of assignments was most intense for them because during the alternate weeks they participated in a second lab course that required similar reports. As a result, each week the Civil Engineering student teams were performing one set of lab tests while collaborating to write an extensive report[1] on a different lab. The professor believed this continual pressure to produce would lead to mastery. He promised students, "You haven't done it [such an extensive report] before, but you will become a master."

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[1] Reports consisted of 10-15 pages of text, plus front and back matter to total 25-30 pages on average.

The Animal Physiology professor, while requiring frequent practice, also believed that reading professional research reports was key to learning to perform the genre of the advanced lab report. In the semester of my research project, he had modified the writing requirements for the lab. He reduced the number of full reports from four to three, but asked students to read and write a brief review of a published research report with each full lab. He believed that studying and summarizing a report related to their own lab experiment would guide students in writing their lab reports. He also created a "mini" report assignment as an "effort to reduce the writing load and focus on essentials." Students wrote three "mini" lab reports, which consisted of an abstract and a combined results and discussion, eliminating the introduction and methods sections. By asking students to deviate from the standard lab report format, this assignment was intended to help them recognize which parts of published papers represented "the essence of a lab report." Animal Physiology students had two weeks after completing an experiment to turn in the report, both for the full reports, which averaged eight to nine pages in length, and the "minis," which averaged four to five pages. Compared to students in Materials, students in Animal Physiology had almost as much practice, but more time to write and more guidance in thinking about the structure and function of the advanced lab report genre.

In both Materials and Animal Physiology, students were given detailed writing guidelines and a grading rubric as well as model papers to study before the first lab report was due. In contrast, this kind of explicit written guidance about how to write the reports was not provided in Animal Behavior until after students wrote the first report. However,

students in Animal Behavior received more individual feedback and more support in their writing process than did students in either Materials or Animal Physiology.

One of the crucial differences between Animal Behavior and the other two courses was that students wrote fewer reports – only three - with more time to work on each one. Students were encouraged, but not required, to submit drafts and receive written comments from the TA for every report. Students had about four weeks to complete a report, given that a week was allowed for drafting, a week for the first round of TA comments, and then approximately two weeks to finish the report after that. Peer review during lab time was carried out during the drafting stage of each report. For the first report, students were required to bring a draft of the materials and methods section to lab, and the entire period was devoted to a discussion of the characteristics of scientific writing and to peer review.

Not only did this lab session underscore the importance of understanding and talking about writing, but, by design, it led many students to try a novel approach to writing a lab report: to begin writing with the materials and methods section. In previous introductory lab courses, the overwhelming majority of students had followed the practice of writing a lab report from beginning to end, starting with the introduction. However, experienced scientists tend to write the results or materials and methods sections first (Rymer 223). Requiring students to bring in only the materials and methods section moved them a step closer to writing and thinking about the lab report the way experienced researchers tend to do.

A second important distinction of the Animal Behavior lab was that students contributed to planning all the experiments. The professor selected the organism(s) and

the topic of study, but students worked in pairs to develop their own hypotheses and then to decide the specifics of the experiment. For example, in the first lab exercise the topic was aggression, and students had a choice of animal models to use – either Siamese fighting fish or crayfish. Then, based on their hypothesis about aggressive behavior, they decided how to vary the particular stimulus (e.g., presentation of another organism) or feature of the environment (e.g., ambient temperature) that they predicted would affect the aggressive response of the organism they were observing. In this way, students embodied the researcher role before they began writing their reports.

In Animal Physiology, on the other hand, all nine experiments were designed by the professor, with the opportunity for students to select of variables in only two of them. In most cases, the experimental equipment was set up by the TAs before the students entered the lab. Students in Materials had even less involvement in planning experiments. They had no input regarding experimental design, and they often spent a significant amount of lab time watching as the procedures and measurements were made by the TA (when complex, expensive equipment was involved) or by classmates (because one experiment was being conducted by seven people). As a result, students in Animal Physiology and in Materials often had to rely on imagination to place themselves in the role of the investigator. They might have had greater difficulty than students in Animal Behavior did in taking on that role when writing their lab reports.

None of the courses I studied gave students explicit instruction regarding the rationale behind the conventions the advanced lab report or the relationship between the genre and its social context. Yet, as I have just reviewed, the courses contrasted in the ways they taught the lab report and structured the assignment, and in the amount of

scaffolding they provided for student writing. Differences in how the genre conventions were taught may have resulted in differences in how students understood the conventions, and so may have led to differences in genre awareness. Making connections between student experiences and development of genre awareness was a primary aim of this project, and I will address it in detail in Chapter Five.

Social Context of Three Courses

In addition to differences in writing instruction, the three courses I observed had distinctive classroom cultures and student populations. These differences may have had implications for the development of student genre awareness. For example, a potentially important factor was the extent to which students identified with the discipline they were studying. Mentoring experiences, specificity of career goals, and social homogeneity may have influenced disciplinary identification, and these characteristics differed among the three courses I observed.

Mentoring was a valued mode of learning in both Zoology and Civil Engineering. Both departments offered students opportunities to get involved with professional work before graduation. In Zoology, students could do independent research projects supervised by faculty mentors, or they could get part-time work in a professor's lab. Among the Zoology students in my study, 71% indicated that they had job, internship, or independent study experience related to their major. Civil Engineering majors often got internships with professional firms, or, less frequently, would work for professors in the summer. Some also gained work-related experience by participating in activities sponsored by the student chapter of the American Society of Civil Engineers, ASCE. Sixty-two percent (62%) of the Civil Engineering students in my study reported such

experiences. However, unlike Zoology students, Civil Engineering undergraduates tended not to do independent research projects or work in professor's labs during the academic year.

The departments also differed in student commitment to a particular career path and in the diversity of student population. The Zoology courses attracted students from different majors in the biosciences. Animal Behavior showed the most variety with eleven different majors among its 37 study participants. The Animal Physiology course was more homogeneous, consisting primarily of Zoology majors (19 out of 25 students, or 76%). However, the Materials course was the most homogenous of all, because as a required course in a popular program, only Civil Engineering majors were permitted to take it. The requirement-heavy Civil Engineering program that permitted few electives as well as the applied focus of the course content contributed to a departmental culture that contrasted sharply with Zoology. Students in the Zoology courses were at different points in their academic careers, with some ready to graduate and others relatively new to their major. The range of anticipated career paths represented among students in both Zoology courses included lab or field research, medicine, veterinary school, and animal management, care, conservation, or training. Zoology students would not expect to recognize all of their classmates on the first day of the semester, and their professors could not reliably predict what the future work experience of a given student might be like.

In contrast, Civil Engineering students moved through four years of required curriculum as a cohort with a shared career objective. The program prepared students for an array of civil engineering sub-fields, but among these, only Environmental

Engineering had distinct program requirements. Through sharing classes and doing frequent group projects, Civil Engineering students who entered in the same year got to know each other well. During lecture, their professors frequently offered advice about how to prepare for their future careers and explained how the course content related to their future job responsibilities. For example, in explaining why the team leader (a rotating responsibility) would receive a double grade for the lab report, the professor explained, "Labs are done like a business...You will be a worker bee and be told what to do by a manager...[the labs will] train you a little on what to expect in the outside world."

Students were considered to be engineers-in-training, and professors frequently admonished them to behave as professionals, even to the extent of proscribing certain kinds of clothing in class and prescribing how students should express themselves when addressing faculty members in person, on the phone, and by email. Identity as an engineering professional was emphasized in the classroom and encroached on students' personal time as well. When the Materials professor told me about adding a non-scheduled class meeting at the end of the semester, he waved his hand toward the students and said simply, "We're engineers." The implication was that faculty could ask students to give extra time without much warning because of the students' dedication to the profession.

Unlike students in the Zoology courses, very few Civil Engineering majors planned to go on to graduate or professional school. The program prepared them for direct entry into the job market. Because of this career focus, students tended to enter the program with a strong vocational commitment to the field. In Zoology, on the other hand,

students could more easily change majors among several options in the biological sciences, and so their career plans could be more flexible. Students in the Zoology courses tended to have more opportunities to take electives, or even to have a double major. Like disciplinary identification, breadth of academic experience - and breadth of writing experiences in particular - was a factor that I expected might influence the development of genre awareness.

Students in the two departments also varied in terms of their social characteristics. As shown in Table 2.2, gender distribution contrasted sharply between the two departments. Study participants in the Materials course were 92% male (4 females, 46 males), which reflected the overall distribution in the class.[2] The gender balance was reversed in the Zoology courses where 44 out of 62 study participants[3] were female (71%). In the two Zoology courses, one professor and one of the four TAs were female, while in Civil Engineering the professor and all three teaching assistants were male. Gender plays a complex role in access to careers in science in the U.S., as does language, class, and race[4]. During my three years of working with both departments, students in Civil Engineering appeared to be more homogenous than in Zoology, and to consist primarily of white, male, English-speaking, middle class students who enter college immediately after high school. Financially struggling students may have had difficulties majoring in science or engineering because of the cost of science textbooks and lab fees, combined with the time demands of a laboratory-based curriculum that would likely prohibit much part-time work.

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[2] Six male Civil Engineering students declined to participate in the study.
[3] Only two or three female students in each of the Zoology course declined to participate in the study.
[4] I did not ask participants to disclose indicators of race or class. As a result, any relationship between genre awareness and race or social class will not be brought out in this study.

Data Collected

The data I collected included classroom observations, two brief surveys of all study participants in the three courses, and hour-long interviews with a subset of students in each course. I also gathered samples of graded student lab reports and interviewed all of the lab instructors. What I was looking for in this data – primarily in the surveys and the interviews - was evidence that students recognized that the conventions of the advanced lab report were chosen and negotiable, based on the values and purposes of the professional research report.

Surveys

Surveys were administered to all participants at the beginning and the end of the semester. Students completed the first survey after hearing a description of my research project, having an opportunity to ask questions, and agreeing to participate in the study by signing a consent form. Survey 2 was administered during the last week of laboratory exercises in the Zoology courses and on the last day of lecture for Materials.

The surveys were limited to one page and consisted of closed questions that could be completed rapidly so that a maximum number of students would fill them out during a lab or lecture period. Participation rates were good (93% of all students completed Survey 1 and 88% completed Survey 2). The questions included on Surveys 1 and 2 are listed in Table 2.4 and 2.5 while copies of the surveys themselves are included in Appendices A and B.

Table 2.4

Survey 1 Questions

1. Name _____
2. Email address _____
3. Lab Day & Time: _____
4. Gender _____
5. Age _____
6. Language(s) you use regularly other than English _____
7. Academic status (circle one) senior junior sophomore other
8. Number of semesters at UNH _____
9. ZOOL: Major ___ / CIE: Area(s) of Interest in Engineering_____
10. Expected career path _____
11. How committed are you to the career path listed in #10?
12. How confident are you about your writing skills (for the lab reports required in this class)?
13. How comfortable are you using Excel and other software used to manage lab data?
14. How many close friends or relatives do you have who are life science researchers / civil engineers?
15. A lab report usually includes an abstract, introduction, materials, results, and discussion sections. When you have to write a lab report, which section do you usually begin to write first?
16. Have you had any employment or internship, or done an independent study project related to your major?
17. What grade do you expect to get on the lab reports you will write for this class?

Survey 1 collected demographic information and asked questions about personal connections to the field of study, career commitment, confidence in literacy skills, writing process, and expected course grade. Questions about writing process, confidence in literacy skills, and expected course grade were repeated in Survey 2 in order to identify changes over the course of the semester.

Table 2.5

Survey 2 Questions

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1. Name _____ Lab Day & Time: _____

2. How confident are you about your writing skills (for the lab reports required in this course)?

3. How comfortable are you using Excel and other software used to manage lab data?

4. How do the lab reports you wrote for this class compare to reports you have written in previous ones?

5. How much time did you spend on writing one lab report for this course? (Estimate an average.)

6. Who should be able to understand the lab reports you wrote for this course?

7. What do you expect your overall grade will be for the lab reports you wrote for this course?

8. What is your view of the following statements about using first person pronouns (I, we, our) in lab reports? (Circle one answer for each statement.)

Agree Disagree Not sure **a.** Avoiding "I" and "we" is a rule of engineering writing.
Agree Disagree Not sure **b.** Some use of "I" or "we" is OK, but usually I avoid it.
Agree Disagree Not sure **c.** I think it should be OK to use "I" or "we."
Agree Disagree Not sure **d.** Avoiding "I" and "we" sounds more professional.
Agree Disagree Not sure **e.** Using "I" or "we" can make sentences clearer and more concise.
Agree Disagree Not sure **f.** In scientific writing using "we" is OK; using "I" is not.
Agree Disagree Not sure **g.** I know when it is OK to use "I" or "we," and when to avoid it.

10. If you would like to add any comments about what has helped you do the writing you needed to do for this course, please write them on the back of this form.

Civil Engineering Only:
Which of the following choices is best for a lab report?

a. The range of permeabilities for this sample ($1.19x10^{-4}$ cm/s to $5.319x10^{-6}$ cm/s) **indicates that this soil sample has poor drainage**.
b. The range of permeabilities for this sample ($1.19x10^{-4}$ cm/s to $5.319x10^{-6}$ cm/s) **suggests that this soil sample may have poor drainage**.

Zoology Only
A lab report usually includes different sections such as introduction, materials, results, and discussion. When you have to write a lab report, which section do you usually begin to write first?

In addition, five new questions were included on Survey 2 (items 4, 5, 6, 9, and 10) for Zoology students, and six new questions (items 4, 5, 6, 8, 9, and 10) were added for the Civil Engineering students. The new items asked students to compare writing the

advanced lab report to previous lab reports and to estimate the amount of time required to complete an advanced lab report. The additional questions also addressed the perceived audience for the lab reports and solicited perspectives on the use of first person pronouns in the lab reports. Item 10 was an open-ended question about student perceptions of what helped them do the writing required in the course. About one third of the students answered item 10, with most of those being Zoology students (25 out of 57 students) and only a handful in Civil Engineering (8 out of 46 students).

The questions added to Survey 2 were suggested by statements students had made during the interviews. There were only minor differences in the versions of Survey 2 prepared for the two different departments. Survey 2 was identical for both Zoology courses and included a question about which section of the lab report was written first when drafting (item 7). This question also appeared with exactly the same wording in Survey 1 and was intended to uncover changes in student writing practice over the course of the semester. I did not use this question in Survey 2 for the Civil Engineering students because the lab reports in their course were written collaboratively. Only once during the semester (when serving as the team leader) did any Civil Engineering student assemble the entire lab report. For all other reports, students wrote only one or two sections, and they often prepared the same section for their team week after week. As a result, it did not seem likely that experience in the Materials course would lead the Civil Engineering students to answer the question about writing sequence differently at the end of the semester. Therefore, I deleted that question from Survey 2 for Civil Engineering students and replaced it with a question about hedging. While hedging is almost always preferred in Zoology reports, my interviews with students and TAs in Civil Engineering indicated

that expressing certainty about experimental results would often be appropriate, particularly in materials testing reports. I added the question about hedging to the final survey for Civil Engineering students to find out if it would reveal this difference in disciplinary values.

Out of the five questions related to genre awareness included on the surveys, the ones about writing process and first person pronoun use proved to be the most fruitful. The question about writing process, which was included on both Survey 1 and Survey 2, had the potential to indicate a change in writing practice over the course of the semester. Such a change was of interest because it might signal a change in a student's understanding of the purpose of the advanced lab report. Students who began writing a lab report by analyzing the data - that is writing the results section first – would have been following the practice of experienced scientists. They might have recognized that the advanced lab report, like the professional research report, was driven by the data, and that all sections of the report were shaped by the findings described in the results section. In contrast, students who wrote the advanced lab report straight through from beginning to end may not have grasped the overall purpose of the genre.

The question about first person pronoun use in Survey 2 presented a range of statements made by students during the interviews in order to find out which views might be shared by the rest of their classmates. In the end, I decided that items b, f, and g were not precise enough to be useful. (See Table 2.5.) Of the remaining four questions, a and e prompted the least ambiguous and the most distinctive responses. Answers to c and d followed the same pattern as the answers provided in a, and so did not provide additional insights into student genre awareness.

Interviews

Students indicated their willingness to participate in individual interviews on the research consent forms they filled out at the beginning of the semester. Seventy-two percent (72%) of the students who agreed to fill out a survey also volunteered to do interviews. In the tenth week of the semester, after all students had completed and received grades on at least two lab reports, I contacted students by email to invite them to do an interview. Among all the students who volunteered for interviews, I contacted only those who had also agreed to share copies of their graded lab reports because I wanted to discuss a report during the interview. This limited the number of Civil Engineering students I could invite for interviews because the reports were written in groups of 6 or 7, and all group members had to agree to share copies of the report.

In the end, I emailed interview invitations to 28 Civil Engineering students, 26 Animal Behavior students, and 15 Animal Physiology students, and I made appointments with the first nine students to reply in each course. One student who agreed to do an interview was taking both Animal Physiology and Animal Behavior, and she became the ninth student to interview for both of those courses. Because of a low response to my first invitation to Civil Engineering students, I sent out a second email at the end of week ten and eventually scheduled interviews with seven students. Students were given the option to do either a 30 minute or a 60 minute interview, and received a $5 gift certificate to a local business for every 30 minutes of interview time. All interviewees agreed to a 60 minute interview.

The interviews were the most useful research tool for this project because they gave me the opportunity to ask students to explain their understanding of the conventions

of the advanced lab report genre. My approach was to begin interviews with general questions about literacy background and career interests and then focus on their experiences writing the advanced lab report.

In designing the interviews, I sought to balance structure with flexibility. Open-ended questions and following the student's interests allowed me pursue each individual's unique perspective. Yet I also sought to ask a minimum set of questions in all interviews to capture a range of views on a few key topics. I consulted Seidman and Kvale when developing the guiding questions for the interview, and I reviewed studies of disciplinary writing or reading that had collected interview data (Cox; Herrington; Haas; Hilgers et al.; McCarthy; Nelson; Winsor). As in Herrington's study, my interviews consisted of an open-ended portion and a discourse-based portion that was the same for all participants. Following Haas, I began each interview with general questions and moved into more complex ones near the end of the interview. Using Kvale's notion of thematizing (94-95), I chose themes for the interviews that had emerged in my pilot studies as potentially relevant to the development of genre awareness. These themes shaped the background questions I asked at the beginning of the interviews, and included

- Student interaction with instructors or other role models and literacy sponsors
- Past work or internship experiences, particularly those that involved writing
- Disciplinary identification expressed in the clarity of career goals and the narrative of their career development
- Reading and writing preferences/habits
- Diversity of past writing experiences
- Social identity as a scientist or engineer

I created two similar sets of guiding questions for the interviews, one for Zoology and one for Civil Engineering. A compilation of the student interview questions are

shown in Table 2.6. The documents used in the interview along with the guiding questions for the instructor interviews are included in Appendix C.

Each set consisted of three main sections. The first focused on background themes, including the source of the student's interest in the course and the field of study, their experiences, if any, with internships, work or independent study in the field, and their literacy experiences. The middle section focused on questions about the advanced lab report, and included asking students to share a graded example of their work and to describe the process of writing it and their understanding of its strengths and weaknesses.

In the final section, which I followed the most consistently across all interviews, I showed students a list of sentences featuring a set of two or three examples representing each section of the advanced lab report (Introduction, Materials and Methods, Results, Discussion). Each set included an actual sentence from a real student lab report,[5] plus one or two variations I had composed to illustrate violations of advanced lab report conventions. I had two versions, one drawn from student lab reports in Civil Engineering, and one drawn from Zoology. The set of sentences used in each interview are shown in Tables 2.7 and 2.8 and in Appendix D.

Table 2.6

Guiding Questions for Student Interviews

General Questions about their field of study
Zoology only: Why did you make time in your schedule for this course? Is it a requirement?
How did you decide on your major? How did you become interested in *Civil Engineering / Zoology*? Have other people been a significant influence on your decision?
Where did your interest in your career plans come from?

[5] The original sentences were excerpted from lab reports I collected during the pilot studies

Was there a time or an experience that was a turning point in your decision to major in *Civil Engineering/Zoology*?

CiE only: What area of Civil Engineering are you most interested in right now? How does this course relate to that?

At this point in time, if you had to place yourself on a continuum between being a student and being *an engineer /a biologist*, where would it be?

CiE only: Do you belong to any professional organizations?

Does most everyone you socialize with know that you are a ____ major?

Do you often talk with your friends about your major or career plans?

Have you had work or internship experiences related to *Civil Engineering/Zoology*? Did it include writing?

What do you know about the writing that practicing *civil engineers/biologists* have to do?

General Questions about Writing & Reading

What has your experience with writing been like? What writing experiences have you had? What other kinds of writing do you do? How do you feel about writing?

What other courses have you take that required writing lab reports?

How do you use *professional/scientific* journals? What else do you like to read?

Lab Reports in this Course

How does this kind of writing compare with writing you have done elsewhere?

How does the way you write now compare with the way you wrote at the beginning if fall semester? What caused the change (if any)?

What resources do you use when writing a report? Do you refer to the instructions provided *by the professor/in the lab manual*? Look at previously graded labs? Talk to people?

How did you know how to prepare the graphs?

Why do you need to cite sources in these reports? F/up: Why is this important in science?

How do these reports compare to published reports that you have read?

Describe the Process of writing this lab report – Civil Engineering.

Show me the parts of your lab report that you are most satisfied with. What is good about this part?

Is there anything about the writing in this report that is characteristic of writing done by civil engineers?

Are there any parts that you are not satisfied with? Why?

What parts were the most difficult to write? Why?

How do you know what to put in each of the major sections of the report? What is the purpose of each? (abstract, introduction, results, discussion and conclusions) What kind of reader would understand each section?

For the Results section, what belongs in the appendix and what in this section?

How did your group decide who would write each part of the lab?

How did you put it all together?

Did you generate the results and conclusions as a group? If you are not the team leader, do you see the results and conclusion sections before they get turned in?

Do you ask for feedback from group members on your writing?

Did you talk with the lab instructors while working on this report?

How much time do you typically spend writing?

At any point did you want more advice or guidance than you have been given about how to write the report?

If you had had more time, is there anything you and your lab partners would have done differently with this report?

After it was returned, what did you do with it? (Has everyone read it? Do you refer to it when writing future labs?)

Would you rather talk with the grader about this report or get written comments?

Describe the Process of writing this lab report – Zoology

Show me the parts of your lab report that you are most satisfied with. What is good about this part?

Is there anything about the writing in this report that is characteristic of scientific writing?

Are there any parts that you are not satisfied with? Why?

What parts were the most difficult to write? Why?

How do you know what to put in each of the major sections of the report? What is the purpose of each? (abstract, introduction, methods, results, discussion) What kind of reader would understand each section?

Do you agree that the results and discussion sections should be separate? Why?

Why should there be no raw data in the results section?

How did you and your lab partner decide which lab reports to write?

How did you go about writing this lab report?

Did you talk with other students about this report while working on it?

Did you take any steps to make it more concise?

Did you talk with the lab instructors while working on this report?

How much time do you typically spend writing?

At any point did you want more advice or guidance than you have been given about how to write the report?

If you had had more time, is there anything you would have done differently with this report?

After it was returned, what did you do with it? (Do you refer to it when writing future labs?)

Would you rather talk with the grader about this report or get written comments?

Examples of Writing – (See separate sheets for each department)

Zoology Only: For "Results" section examples, ask for comment on the role of graphs in the lab report. Agree or Disagree with the following quote: "The graphs are to highlight the text; the text should not talk about the graphs"

Do you prefer the examples that don't use first person pronouns? Why? F/up: Why do scientists choose to write this way?

Summary (both departments)

Overall, how do you feel about the writing you have done in this course? Are you satisfied with the grades you have received on these reports?

What advice would you have about writing for someone just starting the course?

Is there anything else you want to tell me about writing or about learning to write these reports that I haven't asked about?

Table 2.7

Sentence Choices for Civil Engineering Interviews

Examples for Discussion from Civil Engineering Lab Reports

Each set of choices presents two grammatically correct ways to say the same thing. Is one of the choices best for a Zoology lab report? Why? How did you learn this?

Abstract

a. After the TA prepared the specimen, we subjected it to a series of ten incremental loading steps ...
b. After the specimen was prepared by the TA it underwent a series of ten incremental loading steps ...
c. After the specimen was prepared, a series of ten incremental loading steps were performed...

Introduction

a. To understand a soil, it is important to know where it comes from.
b. The knowledge of where a soil comes from is important to its understanding.
c. Knowing where a soil comes from is necessary for understanding it.

Procedure

a. To begin the test, place the first load on the hanger.
b. The test was begun by placing the first load on the hanger.

Discussion

a. ...there was error in the measurement of masses for this trial. Because of this, **we decided to calculate the Plasticity Index** based on the two different values of the Plastic Limit.
b. ...there was error in the measurement of masses for this trial. Because of this, **it was decided to calculate the Plasticity Index** based on the two different values of the Plastic Limit.
c. ... there was error in the measurement of masses for this trial. Because of this, **the Plasticity Index was calculated** based on the two different values of the Plastic Limit.

Discussion (added during course of semester)

a. The range of permeabilities for this sample ($1.19x10^{-4}$ cm/s to $5.319x10^{-6}$ cm/s) **indicates that this soil sample has poor drainage.**
b. The range of permeabilities for this sample ($1.19x10^{-4}$ cm/s to $5.319x10^{-6}$ cm/s) **suggests that this soil sample may have poor drainage.**

Table 2.8

Sentence Choices for Zoology Interviews

Examples for Discussion from Animal Physiology Lab Reports

Each set of choices presents two grammatically correct ways to say the same thing. Is one of the choices best for a Zoology lab report? Why? How did you learn this?

Abstract

a. We designed an experiment to determine if consuming orange juice raised human blood glucose more than oranges or light orange juice.

b. An experiment was designed to determine if consuming orange juice raised human blood glucose more than oranges or light orange juice

Introduction

a. Because oranges only have a GI of 42 compared to regular orange juice at 52, **it was predicted** for this experiment that normal orange juice would cause the greatest increase in blood glucose level.

b. Because oranges only have a GI of 42 compared to regular orange juice at 52, **the hypothesis for** this experiment was that normal orange juice would cause the greatest increase in blood glucose level.

Materials and Methods

a. Five samples of blood were taken in 20 minute intervals throughout the experiment.

b. Blood samples were taken every 20 minutes for 80 minutes total.

Results

a. The graph shows a peak at 20 minutes (123 ± 13.9 mg/dL) after drinking orange juice.

b. At 20 minutes the orange juice group had an average blood glucose level of 123 ± 13.9 mg/dL.

Discussion

a. Some errors occurred in the data, but **a conclusion can be made** that drinking orange juice causes a greater rise in blood sugar than drinking light orange juice or eating an orange.

b. Some errors occurred in our data, but **we can conclude** that drinking orange juice causes a greater rise in blood sugar than drinking light orange juice or eating an orange.

Discussion (added during course of semester)

a. Our data suggest the adult species lack the ability to respond to sucrose.

b. The adult species lack the ability to respond to sucrose.

When I showed the sets of sentences to an interviewee, I explained that all the choices were grammatically correct, but that I wanted them to choose from each set of options the sentence they believed to be the most appropriate to use in the advanced lab

report. Including examples that violated their sense of what was expected exposed tacit knowledge – the "I know it when I see it" phenomenon. However, I was not primarily interested in finding out which sentences they would choose. What I listened carefully for was their reasoning for each choice. What they might say about the rhetorical purpose or the disciplinary values behind their choices would reveal their genre awareness.

As in Winsor's research, my interviews focused on "students' retrospective accounts of their actions" (14). But rather than being a limitation, for my study a retrospective account was precisely what I wanted to obtain. I was not seeking an objective account of their experiences, and the accuracy of their perceptions of disciplinary conventions was not important to my research goals. Instead, I wanted to uncover their awareness of the reasons for the writing choices they were making in the advanced lab reports. Again, my interest was not as much in what they were doing, but the extent to which they were aware of *why* they were doing it.

Near the end of the semester, I also asked all TAs to do an interview, and I was able to schedule interviews with six of the seven. Fortunately, I had recorded an interview with the seventh TA the preceding spring during the pilot study for this project. The TA interviews ranged in length from 60 to 90 minutes and followed a three-part sequence that was similar to the student interviews.[6] I asked the TAs about their previous experiences with writing and their understanding of the goals for the advanced lab report assignment. I then showed them a graded lab report and asked them to discuss its strengths and weaknesses and to compare it to their impressions of other student papers. Finally, I asked them to evaluate the same sets of sentences I had used with the students.

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[6] Guiding questions for the TA interviews are in Appendix E.

All interviews were digitally recorded and then transcribed. I also took notes immediately after most interviews to record my impressions of working with the student and of the salient moments in the interview.

Course Observations

I used the lecture and lab observations to find out how the professors and TAs presented writing and the advanced lab report assignment to students. I was interested in how they described the purpose of the lab reports and the extent to which they invoked a particular social context for the assignment. I also noted advice they gave for writing the reports, and I collected course materials related to writing. These observations, along with the TA interviews, gave me a picture of how the graders perceived the advanced lab report assignment. I could then compare their perceptions to those of the students. I also used these observations to construct my own view of the social context for the advanced lab report.

In addition, observing the lectures and labs familiarized me with the course content so that I could comprehend the key ideas being discussed and investigated in the lab experiments and the lab reports. I also noted the kinds of literacy practices used in lecture and the use of specialized vocabulary. Literacy practices (use of photos, equations, diagrams, graphs, drawings, audio, and video as well as text) and specialized vocabulary were part of the context for writing, and students were expected to use them with little or no explicit instruction.

Student Texts

I collected copies of graded lab reports from all but one interviewee, and from several other students as well. Although the amount of work shared by each student

varied, I obtained a graded copy of the first lab report of the semester from all but one of the 24 students I interviewed. I did not systematically analyze theses texts, but instead used them to clarify student statements about their own writing and to learn more about the TA comments on student work. I was also able to compare a student's perception of the effectiveness of their writing with the TA's written feedback. In addition, the grades on the reports gave me an indication of the success of each one.

Data Analysis

Analysis of Surveys

I entered the data from both surveys into a Microsoft Access database. Survey responses with numerical answers (age, the Likert scale responses, and expected course grade) were summarized and means and modes were calculated. Non-numerical survey responses were summarized as percentages (e.g. the percent of students in a course that gave answer "a.") I also compared each individual's responses to the three questions included in both Surveys 1 and 2 in order to look for changes in student confidence in their writing skills, comfort level using Excel, and starting point for writing the lab report.

Patterns of difference among study participants were explored by stratifying survey responses according to course or department, gender, career commitment, disciplinary work or research experience, and specificity of career path. Stratifying survey responses allowed me to uncover the potentially complicating influences of social characteristics and background experiences on confidence about writing and indicators of genre awareness. I also used survey responses to find out whether students who I interviewed differed significantly from other students in the class in terms of age, gender, year in school, major, or any other question on the surveys (see Tables 2.9 -2.11). Survey

data were incorporated into the genre awareness profiles that were created for each interviewee (described below.)

Table 2.9

Comparison of Survey and Interview Participants in Civil Engineering

Trait	Survey 1 (total = 50)	Interview (total = 7)
Gender	46 (92%) M; 4 (8%) F	6 (86%) M; 1 (14%) F
Age	Mean = 21; Mode = 20	Mean = 21.5; Mode 20
Major	44 (88%) Civil Engineering 6 (12%) Environmental Eng	6 (86%) Civil Engineering 1 (14%) Environmental Eng
Disciplinary Work or Internship	31 (62%) Yes; 19 (38%) No	3 (43%) Yes; 4 (57%) No
Year in School	44 (88%) jr; 1 (2%) grad	6 (86%) jr; 1 (14%) grad
Writing Confidence* (4 is highest)	16 (32%) chose 4 22 (44%) chose 3 11 (22%) chose 2	4 (57%) chose 4 2 (29%) chose 3 1 (14%) chose 2
Confidence with Excel* (4 is highest)	25 (50%) chose 4 14 (28%) chose 3 9 (18%) chose 2	2 (29%) chose 4 4 (57%) chose 3 1 (14%) chose 2
Expected Grade*	13 (26%) chose A 32 (64%) chose B 2 (4%) chose C	4 (57%) chose A 3 (43%) chose B 0 (0%) chose C

*All categories not shown for Survey 1.

Table 2.10

Comparison of Survey and Interview Participants in Animal Physiology

Trait	Survey 1 (total = 25)	Interview (total = 9)
Gender	8 (32%) M; 17 (68%) F	2 (22%) M; 7 (78%) F
Age	Mean = 22; Mode = 20	Mean = 22; Mode 21
Major (partial listing)	3 (12%) Biology 19 (76%) Zoology	2 (22%) Biology 7 (78%) Zoology
Work or Internship	17 (68%) Yes; 8 (32%) No	6 (67%) Yes; 3 (33%) No
Year in School	10(40%) jr; 14(56%) sr	2 (22%) jr; 7 (78%) sr
Writing Confidence (4 is highest)	9 (36%) chose 4 13 (52%) chose 3 2 (8%) chose 2	3 (33%) chose 4 5 (56%) chose 3 1 (11%) chose 2
Confidence with Excel (4 is highest)	10 (40%) chose 4 7 (28%) chose 3 6 (24%) chose 2	3 (33%) chose 4 3 (33%) chose 3 2 (22%) chose 2
Expected Grade	7 (28%) chose A 15 (60%) chose B 3 (12%) were not sure	4 (44%) chose A 4 (44%) chose B 1 (11%) was not sure

Table 2.11

Comparison of Survey and Interview Participants in Animal Behavior

Trait	Survey 1 (total = 37)	Interview (total = 9)
Gender	10 (27%) M; 27 (73%) F	0 (0%) M; 9 (100%) F
Age	Mean = 21; Mode = 21	Mean = 21; Mode 21.5
Major (partial listing)	8 (22%) Animal Science 4 (11%) Marine Biology 5 (14%) Wildlife Managemt 19 (51%) Zoology	2 (22%) Animal Science 1 (11%) Marine Biology 4 (44%) Wildlife Managemt 2 (22%) Zoology
Work or Internship	27 (73%) Yes; 10 (27%) No	8 (89%) Yes; 1 (11%) No
Year in School*	3 (8%) soph; 26 (70%) sr	2 (22%) soph; 7 (78%) sr
Writing Confidence (4 is highest)	10 (27%) chose 4 22 (59%) chose 3 5 (14%) chose 2	4 (44%) chose 4 5 (56%) chose 3 0 (0%) chose 2
Confidence with Excel* (4 is highest)	14 (38%) chose 4 10 (27%) chose 3 12 (32%) chose 2	2 (22%) chose 4 6 (67%) chose 3 0 (00%) chose 2
Expected Grade	12 (32%) chose A 24 (65%) chose B 1 (3%) chose C	4 (44%) chose A 5 (56%) chose B 0 (0%) chose C

*All categories not shown for Survey 1.

Analysis of Interviews

Although each interview was unique, the list of questions I used to guide all the interview ensured some overlap in the topics discussed by all participants. The goal of the interview was not to create a detailed portrait of each student, but instead to gather perspectives from a range of individuals with different literacy backgrounds and disciplinary experiences and then to look for patterns of genre awareness. The search for patterns began with identifying the evidence of genre awareness each student exhibited, primarily from their statements about the rationale for genre conventions and their

accounts of their writing process. I also looked for student statements that characterized (1) their previous experiences with writing, reading, and math, (2) their narratives of career development, and (3) their tensions, difficulties, or successes in performing the genre of the advanced lab report.

Creating Genre Awareness Profiles

I studied the interview transcripts and extracted statements that were indicators of genre awareness or that were relevant to the student's literacy background, disciplinary identification, or experience learning to write the advanced lab report. I assembled this evidence into genre awareness profiles for each student. The profiles made it possible for me to look for patterns of similar statements among the students, and to look for possible relationships between genre awareness, literacy background, social characteristics, and disciplinary identification.

The genre awareness profiles consisted of four sections: (1) demographic data gathered from the surveys, (2) background information regarding literacy experiences and disciplinary identification, (3) indicators of genre awareness, and (4) tensions associated with learning the genre of the advanced lab report. A template for the genre awareness profile is provided in Table 2.12, and a typical student profile included in the Appendix F. I also created genre awareness profiles for the teaching assistants. These were similar to the student profiles, except for the fourth section which focused on the TA's perspectives regarding the purpose of the advanced lab report assignment and aspects of it that they believed were most challenging for students.

Table 2.12

Template for Creating Genre Awareness Profiles

Student ID:

Survey Data

Gender:	Age: 20	Year: junior
Area/Major:		
Expected Career Path:		
Writing Confidence		(4=high)
Confidence with Excel		(4=high)
Expected Course Grade		

1. Background - Literacy Experiences and Disciplinary Identification

Reading:

Writing:
- Confidence
- Breadth of Experience

Math:
- General
- Statistics
- Tables & Graphs

Other Studies:

Disciplinarity –

Career Commitment	(4 is most committed)
Friends/Relatives in field	
Source of Interest	
Length of career interest	
Specificity of career interest	
Continuum response	
Work/Internship	
Friends Know?	

Career Path:

2. Evidence of Genre Awareness

Rationale for Genre Conventions

avoiding first person pronouns	
citation of sources	
conciseness	
statements reflecting certainty	

References to audience or reader needs to explain writing choices or their understanding of how to write a lab report

References to purpose or function/use of report

References to underlying beliefs/values

Use of Rhetorical Vocabulary

Variability within genre

Comparison to earlier lab reports

Comparison to other kinds of writing

3. Writing Process and Tensions learning the genre of the advanced lab report

Genre Acquisition:

Similarity of reports to previous (4 is most similar)
Section writes first & why:
What part does he like to write best:
Significant preparatory experiences

Current Process:

Changes in writing process this semester

What was new or difficult

Initially, I created very broad profiles that included ample material from each interview. I then studied the genre awareness sections of these profiles to identify both common statements and unique perspectives. As I grouped together similar statements that students had made in response to key questions, consistent themes began to emerge. I listed these themes in three "supra-profiles," one for each course. The "supra-profiles" enabled me to recognize patterns among students' experiences and to see connections between indicators of genre awareness and factors in the other three sections of the profiles (e.g. literacy background, career goals, difficulties with the advanced lab report).

Assessing Genre Awareness

My evaluation of the genre awareness demonstrated by study participants did not focus on how well they wrote advanced lab reports or even how thoroughly they explained the requirements for a report. I was not interested in the level of detail they

could give about the steps involved in writing a lab report, though I did ask them to describe their lab report writing process. Instead, I was looking for what they might say about the language conventions and writing practices they followed when performing the advanced lab report genre. I wanted to know if they could explain why the advanced lab report was what it was, and why it was different from (or similar to) other kinds of writing experiences they had done. I was interested in what they might say about how the social context for the lab report interacted with their experience of writing it. When the students I interviewed talked about their writing, I listened not for their understanding of *what* to write, or *how* to write it, as much as for their understanding of *why* they followed particular lab report conventions (generic forms). I listened for statements that showed "a critical consciousness of the rhetorical purposes or ideological effects of generic forms" (Devitt 192).

Guided by Devitt's definition of genre awareness, I assessed student genre awareness by cataloging statements related to rhetorical purposes or ideological effects. First, I looked for evidence of "a critical consciousness of rhetorical effects" by searching the genre awareness profiles for statements about the audience or purpose of the advanced lab report, and in particular for any references to audience and purpose that students might have made when explaining the language or format conventions of the advanced lab report.

Second, I looked for evidence of "a critical consciousness of the ideological effects of generic forms" by examining the genre awareness profiles for statements relating language conventions of the advanced lab report to the beliefs and values typically associated with scientific research. In my analysis, I focused on two particular

language conventions: (1) the use of first person pronouns, and (2) citation of relevant research and standards. In addition, I asked students to compare writing lab reports with other kinds of writing as a way to expose any awareness that different disciplines follow different writing conventions because they hold different values and beliefs. I looked for evidence of "a critical consciousness of rhetorical effects" by searching the genre awareness profiles for statements about the audience and purpose of the advanced lab report, and in particular for any references to audience or purpose that students might have made when explaining the language or format conventions of the advanced lab report.

I gathered together all the statements I had identified into two categories (ideological effects and rhetorical purpose) and chose six of the most common and least ambiguous groups of statements as indicators of genre awareness (see Table 2.13). When possible, I grouped student statements about each indicator into categories of high, low, and no awareness. The rating scale was relativisitic. That is, I placed a statement in the "high awareness" category if it indicated the greatest awareness I observed among the students I interviewed. The purpose of sorting the statements and comparing students to each other was to find out if relative differences might reveal any patterns connecting previous experiences with the development of genre awareness.

After creating the groupings of statements for each of the six indicators, I focused on the rankings of individual students across all of them. For those students who appeared most often in the "no awareness" or "highest" categories, I compared statements they had made about their previous experiences, educational choices, and

literacy background in order to look for patterns. The results of this analysis is presented in Chapters Three through Five.

Table 2.13

The Six Indictors of Genre Awareness Used in This Study

Indicators of Awareness of Ideological Effects were student statements...	
Indicator 1	...responding to direct question about first person pronoun use
Indicator 2	... responding to direct question about citation practices
Indicator 3	... comparing lab reports to other kinds of writing
Indicators of Awareness of Rhetorical Purposes were student statements...	
Indicator 4	...comparing the advanced lab report to introductory reports
Indicator 5	... referring to reader needs to explain lab report conventions
Indicator 6	... referring to rhetorical purpose to explain lab report conventions

Limitations of the Study

While my research produced some interesting and unexpected findings, any conclusions drawn from it must be tempered by the limitations of the study design and data analysis. One of the main limitations was the self-selection of study participants. I can not generalize about all students in these Zoology and Civil Engineering courses because I did not interview all of them. For example, only a handful of the students I interviewed seemed resistant to thinking reflectively about their writing. However, this observation may not be true of the entire group of students in the three courses. Because students volunteered to give interviews, it is plausible that the more reflective students might have been the ones to volunteer to spend an hour talking about writing. So the actual percentage of resistant students in the entire class might have been higher. In addition, survey data suggested that the students who volunteered for interviews expected to receive higher grades and were more confident about their writing than most of their

classmates. As a result, their genre awareness might also have been different from that of other students in these courses.

Data collection methods also limited my assessment of student genre awareness. I relied primarily on the interviews to characterize student genre awareness, so the quality of my interaction with the interviewees was an important limiting factor. Some interviews flowed more easily than others, which generated concern that my findings of no genre awareness might actually reflect the fact that a student was not a particularly garrulous person or that he or she did not feel comfortable talking with me in the interview setting. Fortunately, this was not my perception of the interviews with any of the students whom I ended up assigning to the "no awareness" group. Students who were the least talkative during the interviews (Nancy and Max) ended up in the middle of the genre awareness rankings. (See Tables 5.2 and 5.3.) Both Nishan and Liz, however, were very sociable and talked readily with little prompting from me. It is possible that my assessment of their high genre awareness might have resulted from their volubility. It was likely easier for me to collect relevant statements from them than from students who had less to say in our hour-long interviews. The length of the interviews, and the especially the fact that I had no opportunity to follow-up on student statements in further interviews, also meant that my data represented only a very rough approximation of these students' genre awareness.

There were at least three important limitations of my analysis of the data. One is that I did not recruit colleagues to cross-check my interpretations of the data. I have no evidence that other experienced writing teachers would reach the same conclusions I did about my data. Other concerns derive from the fact that I performed the analysis almost a

year after collecting the data and, as a result, I no longer had ready access to the participants. I could not easily go back to them with follow-up questions about my interpretations. I also did not meet with any of them to ask them to read and comment on my depictions of their experiences and understandings about writing. However, I did send a follow-up email to all of the Civil Engineering students that I interviewed. These students were juniors at the time of the interview, and so they were still enrolled in their program when I had completed my analysis of the data. In my follow-up email, I asked them about their plans after graduation and three brief questions about their current perspectives on writing. I also offered to send them the transcript of their interviews and the parts of my dissertation that focused on writing in Civil Engineering. Five of the seven replied, and only one, Nishan, requested a copy of my work. He made no response to it. I also gave them the chance to choose their pseudonym, and all who replied did so.

Researcher Positioning

In her chapter in Strategies of Qualitative Inquiry, Valerie Janesick points out that "qualitative researchers accept the fact that research is ideologically driven" (56). In addition, her heuristic listing of design characteristics makes it clear that qualitative research is personal and depends on the individual traits of the researcher and on the relationship the researcher establishes with study participants. She points out, "Qualitative design requires the researcher to become the research instrument" (57).These observations were certainly true of my project. For this reason, my relationships with study participants and the ways my beliefs and biases may have contributed to the study design deserve examination.

In relation to my research questions, I recognize at least two biases. First, I began the project with enthusiasm for explicit teaching of genre awareness. Teaching students to "learn how to learn" rather than to perform particular genres has a strong intuitive appeal, and the notion of teaching students about writing by using a curriculum focused on writing studies research was generating a lively discussion in professional journals and at conferences. My interest in this pedagogical approach might have inclined me to see benefits for students who exhibited genre awareness and prepared me to notice problems for students who did not.

In addition, from the outset I hoped that my research would contribute to efforts to broaden the scope of first-year writing courses to include texts referred to by Moskovitz and Kellogg as "primary scientific communication (PSC)." My experience writing in the workplace as well as familiarity with the work of scholars such as Charles Bazerman and John Swales led me to agree with Moskovitz and Kellogg's argument that PSC is "rhetorically appropriate and sufficiently rich" for first-year writing courses (307). As a first year composition instructor, I had also heard science majors in my classes complain that essay assignments were not relevant to the kind of work they hoped to do in the future, and I was well-aware that their future did indeed include a great deal of discipline-specific writing. I began this study convinced of the value of making connections between composition pedagogy and the needs and purposes of students writing in advanced laboratory classes. This motivated me to try to keep my project relevant and accessible to composition studies scholars rather than emphasizing its implications for disciplinary faculty or even for technical writing courses.

These biases and my educational and professional background influenced my choice of a research site. I could have carried out my study of student genre awareness in any writing intensive course that required students to perform distinctive genres. In any writing intensive course in any discipline, I could have sought student perspectives about the rationale for the genre conventions they were learning to perform. I chose lab courses because of my familiarity with scientific discourse both as a student and in the workplace. Like some of the students I interviewed, I, too, had been mystified and frustrated the first time I was required to include a "literature review" in a lab report. I remembered venturing into the chemistry library without a clue as to where this "literature" was or how to determine which articles might be "relevant" to the organic chemistry experiment I had performed.

Beyond empathy for the plight of the students who found themselves "strangers in strange lands" (McCarthy), I also had an understanding of how professional research or testing reports were used in the workplace. As an Environmental Health Specialist working for a research clearinghouse, I had helped to edit and compile epidemiological studies of human exposure to electromagnetic radiation in order to help scientists, engineers, physicians, and policymakers understand potential health risks and decide whether protective action was needed. Working for a different consulting firm, I had measured human exposure to chemicals in the workplace and written reports of my findings for colleagues and clients. When I was a recent college graduate with a chemistry degree, I had worked in an environmental testing laboratory and produced data that would be combined with the work of others on my team into a report written by our manager. I could draw on work experiences such as these to help me envision the

connections between the advanced lab report assignment and the professional research or testing report. My project depended on the depth of my own understanding of the genre because the extent of my own genre awareness would define the limits of my ability to recognize the genre awareness of the study participants.

The common ground established by my previous education and work experiences also helped me gain acceptance and trust among the instructors and students I observed and interviewed. Even though I was a writing specialist from the English Department, I was not a complete "outsider" to science and engineering. As I stood before each class and lab section to explain my project and invite participation, I always highlighted my own scientific work because I was well aware of the vulnerability of my project. Just as I was dependent on the professors and teaching assistants to give me access to their students, I was even more dependent on the students. If no one volunteered, I didn't have a project. Ultimately, my research depended on other people accepting me enough to be willing to work with me.

Even before beginning to plan this research project, I had built personal relationships with members of the Zoology and Civil Engineering departments through my role in the university's Writing Program. In 2005-2006, two years before conducting dissertation research, I served as a Departmental Writing Fellow in Zoology. The Chair of the Department directed me to support graduate students with their individual writing projects and in their teaching of writing. Coincidentally, one of the graduate students I had worked with during that time served as a TA in the Animal Physiology class I observed in this research project.

In Civil Engineering, I had discussed the program's goals for writing with the Department Chair when designing my syllabus for a Technical Writing course reserved for their majors. I had taught Technical Writing for Civil Engineers for two semesters before beginning my dissertation research project, and students who had been in my first course were juniors enrolled in the CiE 622 Materials course I observed. In fact, four of the students who agreed to give interviews had previously been in one of my Technical Writing courses. Because these students had worked with me before, they may have felt more comfortable than other students did with volunteering to work with me. In Chapter Three, I discuss how my previous relationship with these students might have influenced the way they talked with me about writing during the research interviews.

In addition to pre-existing relationships with some of the undergraduates, I also had gotten to know graduate student TAs in both departments when I piloted my dissertation project in Animal Physiology in fall 2006 and in Soil Mechanics in spring 2007. By the time I began my dissertation research, I already had positive working relationships with the chairs of both departments, the professors of both Zoology courses, and the most senior TAs in all three courses.

In carrying out my study I also sought to offer some benefit to study participants in return for the professional benefit I would receive from their willingness to help with my project. In appreciation of the support extended to me, I gave presentations about writing to all Zoology lab sections and offered "writing office hours" on a weekly basis to students in both departments. An additional consequence of these efforts was that my regular presence in the department may have helped students to recognize both me and

writing as a legitimate part of their disciplinary life rather than as someone and something belonging only in the English Department.

It is likely that the mere existence of my research project raised student and instructor awareness about writing in general and encouraged them to reflect on their own writing practices in particular. Although it was not my explicit aim, the act of carrying out my research project may have advanced my goal of achieving mutually beneficial connections between the English Department (the recognized home of first year writing courses and the writing center[7]) and writers and writing instruction in Civil Engineering and Zoology.

[7] The students and TAs I talked to tended to assume that the writing center was part of the English Department, even though at our institution it was administered by the Writing Program and had no organizational connection to the English Department.

CHAPTER III

STUDENT AWARENESS OF RHETORICAL PURPOSES

To investigate the ways in which students demonstrated "a critical consciousness of rhetorical purposes of generic forms," I focused primarily on what students had to say about audience and purpose for their writing. My goal was to find out whether students were aware that salient features of the lab report (such as its stylistic conventions) were related to audience needs and writer purposes. My investigation of student awareness of rhetorical purposes revealed that some students seemed to have more awareness than others.

This chapter begins with a discussion of whether students recognized the complexity of the rhetorical situation of the advanced lab report. I then consider in turn the three kinds of statements that I had determined would constitute indicators of awareness of rhetorical purposes. Indicator 1 consisted of student comments about reader needs.[1] Indicator 2 included three ways that students referred to the purpose or function of the advanced lab report in order to explain its conventions. And, finally,

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[1] Even though in practice considerations of audience and purpose are intertwined, I treat audience and purpose separately. Likewise, separating my discussion of "ideological effects" from my consideration of "rhetorical purposes" also creates an artificial division. In the natural course of writing and thinking about writing, people simultaneously draw on all the genre awareness they possess as well as other kinds of knowledge and experience. My "vivisection" of student genre awareness serves to streamline and clarify my analysis of student statements. The assumption I am making is that considering the aspects of genre awareness separately is like taking a freeze-frame of a video in order to be able to look carefully at the details of a fast-moving action. If I attempted to analyze student statements for evidence of genre awareness as a whole, the complexity of that concept would require me to provide extensive explanation (clarification or qualification) for each statement. The cumbersome explanations would burden the reader and obscure the points I am trying to make.

Indicator 3 showed how student statements comparing the advanced lab report to earlier introductory reports could be used to reveal student perception of the connections between genre conventions and its rhetorical purpose.

In the three courses I observed, students performed the advanced lab report genre in two overlapping rhetorical situations: the classroom one where they were producing an assignment that would be read and graded by the TA, and the hypothetical, professional one where they would be generating data that would be read and used by other scientists or engineers. My method for assessing genre awareness favored students who focused on the professional context for the lab report in addition to the classroom context. This occurred because the advanced lab report was modeled on the professional research report, and as a result many of the advanced lab report's conventions were shaped by the professional social context. Therefore, students who were mindful of the professional context – even if their ideas about what that context was like were not accurate- would be more likely to make statements that I would consider to be evidence of genre awareness.

Identifying an Audience

My interview with one of the TAs in the Materials course alerted me that students may not have an explicit awareness of audience, let alone an awareness of how reader needs have shaped the conventions of the lab report. When I asked him, "Who should be able to understand this?" he replied with a self-conscious chuckle, "I don't really look at it too much. I never really thought about it. I mean, as long as I can understand... I just don't have the time to do that...as long as [it] looks presentable that

is all I am looking for." If the TAs were not thinking about audience, I wondered if students would.

To make a rough initial estimate of whether students were mindful of writing for a reader, I searched each interview transcript for unprompted uses of the word "audience" or forms of the word "read" used by the student to refer to a reader of the lab report. I was surprised that in most of the twenty-four interviews, such usage occurred only one or two times during an hour-long conversation about writing. Three students (Barbara, Sherry, Zoe) never used those words at all. This very crude measure does not mean that Barbara, Sherry, Zoe never spontaneously discussed the reader of their reports during the interview. Instead, it may simply mean that they were not accustomed to using these terms to talk about their writing. In contrast, Robyn introduced the word "reader" into our conversation eight times independently of me using it in the questions I posed. Similarly, Nishan used "reader" seven times, and Nancy six times.[2] These three students referred spontaneously to the reader's needs when explaining an aspect of the lab report, so I considered these comments to be evidence of genre awareness (Indicator 1).

To get a sense of whether they were focusing on the professional context in addition to the classroom context for their lab reports, I asked students about the audience they had in mind when writing the lab report. I observed a range of responses to my direct question. A few students claimed that, like the TA mentioned above, they

[2]Both Nishan and Nancy had been my students in my Technical Writing course in which I emphasize a writer's need to think about audience and purpose. Simply talking with me about writing might have prompted them to use these terms. However, interviewees Ava and Sean had also been my students and they did not refer to the reader as often.

did not think about a reader at all, and an equally small number said they were writing with a professional audience in mind. Most students identified a classroom audience.

No Audience

Three students identified an audience for their reports, but admitted that they did not think much about audience when writing. Max's response indicates how a pragmatic focus on the immediate classroom context can override awareness of the hypothetical one. Sophia and Sondra seemed to be saying that thinking about audience was irrelevant to they way they write.

Max, a Civil Engineering (CiE) student
Max: Occasionally I will think of [pause] try to put the results into a form that someone like from a company would read...but sometimes that just gets lost in translation when you are just trying to get the lab report done.

Sophia, an Animal Behavior (AB) student
Joleen: When you are writing do you think much about who is going to read it?
Sophia: Like again, I don't think I consciously do. But the way I write, I think it would be understandable by anyone who would just pick it up and read it.
Joleen: All right. It is not something that you have spent a lot of conscious time thinking about.
Sophia: No.

Sondra, an Animal Physiology (AP) student
Joleen: When you are writing do you have somebody in mind who would be the reader of this?
Sondra: Not really. I can see what you are saying. I remember back when I was learning to write. Like, Who is your audience?... Some times I take a third day to read it. I don't even write anything I just read through to make sure I didn't spell anything wrong. And I read through it and then I am like, "Alright, Jack [the TA] told me not to use words like 'basically'" ...I don't really think "Jack is going to be reading it." I think "in Carl's paper [the professor] he had his legend like this." When I go back and do it again, I don't think that they are going to read it. I just try to remember what they told me.

Classroom Audience

TA as Audience. Not surprisingly, the reader mentioned most often was the TA. Students like Nancy, Frank, Nishan, and Zoe explicitly recognized the compound rhetorical situation by naming both the TA and a hypothetical reader. However, these students usually added that the primary reader they had in mind was the TA and that they could ignore the hypothetical reader.

Nancy, an AP student
Nancy: If this was a real paper then it would probably be towards someone who had some knowledge of the subject area... I think the purpose of these lab reports is just so the teacher knows that you know what you are talking about.
Joleen: So you are thinking about the TAs
Nancy: Exactly

Frank, an AP student
Joleen: Do you have a reader in mind when you are writing?
Frank: I guess it is the TAs I suppose. ...with Organic Chem I think we were told to make it so that a lay person could do what you did... Whereas this one tells us to write it like we are submitting it to a journal. So I guess it just depends. Usually, I just assume that the TAs are reading it. That is who I am writing it for (p 9).

Nishan, a CiE student
Joleen: When writing, do you have this guy [hypothetical client named in the lab assignment] in mind? Who are you thinking is going to read this?
Nishan: ...You have to think of the company that is going to read this. At the same time, it is a lab so you don't have to address him too much because they really don't care. He is made up.

Zoe, an AP student
Joleen: When you write these reports do you have a particular audience or reader in mind?
Zoe: The TAs... I just write for the class for the TAs because I know they [the reports] are really not going to be going out on the market. Nobody else is going to be citing these.

Peers as Audience. Other students asserted that they were writing primarily for themselves. When John said this, I understood him to mean that he was assuming

responsibility for ensuring that his report satisfied the rubric rather than relying solely on the TA's evaluation.

> *John, a CiE student*
> Joleen: Do you have a particular reader in mind?
> John: Certainly myself, and overwhelmingly the lab instructor. As far as how the document reads it is for me. As far as how it looks, it is the instructor.

However, students like Ginny, Heather, Ava, and Anya explicitly stated that they were writing to be understood by a reader like themselves or even someone less experienced. Ginny drew on her own experience as a student when she described the audience she was writing for. Unlike some of her classmates, Ginny had not yet participated in any science-related work, internship or independent study experiences. For this reason, it may have been more difficult for her to position herself in the role of the researcher reporting findings, as would be necessary when writing the advanced lab report. Imagining a younger reader seemed to help her see herself in the authoritative role of the "older" expert. Though this strategy may have helped her in some ways, it led her astray from the rhetorical purpose of the advanced lab report.

> *Ginny, an AB and AP student*
> Joleen: When you are writing these, who do you think is going to read it? The TAs pretty much? ... Do you have an audience for your writing?
> Ginny: In the back of my head I think of the TAs ...I do kind of think of an audience to try to make it the best it can be obviously for a grade, but for other people, too, and try to make it interesting for them.... An imaginary audience.
> Joleen: and would it [be] for someone like yourself, a student or ?
> Ginny: Yeah, most likely a student looking it up...Even if it was a high school person, like someone younger than me. I always imagine someone younger than me. Cause I always imagine the people writing the papers are older than me, the people writing the journal articles about he experiments they did. Even when they say they are in college, still I say they are older than me even if it is a graduate student (p. 14)

At first Heather stated that she didn't have an audience in mind when she wrote, but went on to explain that her ability to write at the professional "level" was limited by her current grasp of disciplinary terminology.

Heather, an AP student
Joleen: ...do you have somebody in mind who is going to read it?
Heather: I guess not really. I don't really. ..I don't know if you are suggesting as opposed to like a professor as opposed to a TA if you would write differently for either one? Cause I kind of put them all on the same level
Joleen: I was thinking how you pick the language, how you decide what to say...
Heather: Oh I guess ..my thought is trying to use technical terminology that I know the meaning of ... I mean there is a lot of big words that I know, but I don't necessarily know how to use them correctly... I am not trying to sound smarter than I am. .....I don't have that vocabulary ... I guess to answer your question,... I am writing for a professional scientific individual who is on my level, if that makes sense.

Ava, who strongly identified as an engineer, envisioned a homogenous, disciplinary audience for her lab reports. She implied that she did not need to devote much attention to shaping her writing to meet the reader's needs for such an audience. Disciplinary identification and an assumed familiarity with her audience allowed Ava's awareness of audience needs to remain tacit.

Ava, a CiE student
Joleen: Who is the audience? Do you have an audience in mind?
Ava: Just us... we don't usually write so that someone who is out of engineering can understand it... We do define it [technical terms] but not to an extent that everyone in the world will understand what you are talking about. It's just basically for our general audience. For our group members and our TA to be able to understand and get our point across.

In contrast, Anya, who as a sophomore was a relative newcomer to writing in Zoology, found not being able to imagine an audience different from herself to be a "problem." Anya seemed to understand that writing in any social context must be

responsive to the needs of the intended audience. However, her comments suggested that this understanding was not sufficient to guide her in writing advanced lab reports.

Anya, an AB student
Joleen: Do you have a reader in mind what kind of person...?
Anya: Actually as a writer that was [pause] my biggest problem was perspective. Like even like with fictional stuff or my philosophy class I always have a hard time trying to find a the right person ...because I always think that it is me reading it maybe?... I think, "Oh this person that is reading it probably has the same experience I have." So it is hard for me to imagine someone that has no idea what I am talking about trying to understand what I am talking about...

Professional Audience

Barbara, James, and Rob made it clear that they were writing their lab reports with a professional audience in mind. Barbara, who also worked as a writing center tutor, was very familiar with the question, "Who is your audience?" She acknowledged the dual rhetorical contexts for her lab report, but chose to focus primarily on the hypothetical professional context. Although she stated that the TA is "in charge of" the lab report, when she encountered a difficulty in writing it, she looked beyond the rubric and grader and found her solution by modeling her writing on published research papers.

Barbara, an AB student
Joleen: When you write these, what kind of person do you have in mind? Who should be able to understand this report?
Barbara: OK, so my audience. First the TA because the TA is the person grading it. The TA is really the one that is in charge of it. But because I am trying to be more professional, and this a 700 level and the classes I am taking now where I'll write reports are higher level, so a lot of it's trying to write towards more professional basis. And... especially with this one [she indicates the text she has brought to discuss during the interview] because it is like "Oh crap! How shall I write this results section?" I would go back and read through the results of a couple of different papers to see how they set it up how they structured it. And I was like OK I will try to do something similar to that because it is the professional way to do it.

When reviewing his process for writing the discussion section of the lab report, James emphasized the importance of responding the hypothetical client, Al Einstein[3]. Like Barbara, James focused on the professional context, and even made a direct comparison between writing the lab report and writing in the workplace.

James, a CiE student

James: You gotta read what Mr. Einstein wrote. What does he want to know? And you have to answer that specifically. Which I think a lot of groups don't do, and I think that is why a lot of groups lose points. [Hypothetically]You are being paid to do something, but you are not answering his questions. I found that that applies well at work, too, because if your boss, if you don't give him what he or she asks for then they are not going to want you to work for them again, and you will end up copying and making coffee.

In Rob's interview, I asked him directly whether he paid attention to the hypothetical client, Mr. Einstein. Although I am not sure that he would have identified a professional audience if I had asked the more open-ended question I posed to Barbara, Rob's response indicated that he had definitely thought about the professional audience while writing the reports. I think his words also imply that he had not considered a particular reader for lab reports he had written in the previous courses.

Rob, a CiE student

Joleen: ...the cover letter that they gave on the lab assignment from Mr Einstein, is that in your mind at all when you are writing?

Rob: Actually, a couple of times [pause] I think that really has helped me ...to think of it as you are writing to this company, and you have to explain to this company. If you want their business, you have to prove that what you are doing is relevant and what you are doing is correct. I think that has helped just to kind change your perspective. Not just to say, "I have to get this lab report done. I have to put this information in there." But like somebody is really going to be reading this, and I have

[3] Each lab is presented to students as a request for professional services from Al Einstein of A.J. Construction.

> to really explain this to them so that they understand and so they know that what we did was good stuff. So yeah, I think that has helped.

In response to my direct question, only three students identified a professional audience for their lab reports. Grades and frequent, detailed written feedback kept students very aware of the TA as the audience for their lab reports. Even though the TAs regularly reinforced the idea that the reports were to be written as though they would be used by a professional reader, several students pointed out differences between professional research papers and what the TAs expected them to do with their lab reports. They often prefaced these statement, as Nancy did, "If this was a real paper, then it would probably be towards someone who had some knowledge of the subject area so you don't have to explain everything to them." Frank was the most articulate about this tension between the classroom context and the hypothetical professional context. He touched on this several times during the interview.

> *Frank, an AP student*
> Frank: It is kind of like you were being pulled in two directions. The professors always say like "Write the paper like you were writing for a journal... and also look up in the primary literature what you did." But the primary literature on what we did which was really basic chemistry was printed in 1912, and nobody has that paper and nobody does that experiment."

Later in the interview he returned to this issue:

> *Frank, an AP student*
> Frank: We are supposed to assume this is being sent to a journal or whatever. So I presented my statistical results and that was it... but I was told to explain... what the statistics meant. [In response] I was like, "No. I don't really have to. I understand what it means, you understand what it means.,, and everybody reading the journal would understand."... It is hard to write a science paper because that is one of those things: Who is reading it? I assumed the reader would know ....I thought it was silly to explain basic statistics if I was submitting it to a journal.

Frank seemed to feel that imagining a hypothetical professional audience for the lab report was a frustrating charade. Nevertheless, as the interview excerpts presented in this chapter show, some students could envision a professional context for their lab reports as well as the classroom one. Some drew on job or internship experiences in order to see how lab reports were like "real papers." Yet, even those without workplace experience could imagine the professional context. Some had learned about the professional context by talking with friends or family members who were scientists or engineers. Others described how their perception of the professional context had been informed by guest lecturers or media experiences, such as reading or viewing both nonfictional and dramatized accounts of scientific or engineering work.

In addition, students could interact in a limited way with professionals in their field through the professional literature. Several students learned to use published research papers or laboratory standards as guides to writing the advanced lab report. I have already presented Barbara's account of using a professional research report as a model. In addition, Zoe also described a specific instance when she turned to a professional paper to solve a writing problem.

> *Zoe, an AP student*
> Zoe: I didn't know what I would write for the abstract for the last one. That was the one where it didn't work so I didn't know [pause] What do you say? 'This experiment didn't work at all. Nothing happened as expected.' I wanted to go back and find out how I should do that. And I did. I looked at a couple of journals abstracts that were saying 'our null hypothesis was proved true.'... So I went back and modeled it after those.

Likewise, John used the published protocols for the procedures used in lab to guide his writing, saying "when I read the ASTM standards, I can make a comparison to the way that our reports [should] look like." Paul, a native Chinese speaker, talked about using

published research reports to provide models for the kinds of language he needed to use in his writing.

> *Paul, an AP student*
> Paul: Published articles. Literature. Yeah, that [is] also important. Just read what other people are writing. Most of them are PhDs. They have experience. They have been in that field for 10 years, 20 years. They know how to write it. We are entry level. We just step in this area. We have a lot of thing s to learn.
> J: You read that not just to read it but to see how it was written ...
> Paul: Right. Right. Yeah. I look at the idea then sometimes.. I think in this way: If I want to express this idea, what I would write? Then compare to what they wrote. I would find they are much better or 10 times better than what I want to write... so that is what I should learn.

Cox has argued that middle spaces exist between academic and workplace writing. She found that graduate students in a Communication Science and Disorders program moved through a continuum of coursework, on-campus internships, and off-campus internships that bridged the classroom-workplace divide. The dual nature of the rhetorical situation of upper-level lab courses might also constitute a "middle space" where students can begin to learn from professional examples. My assessment of student awareness of the rhetorical purposes of the advanced lab report depended in part on this possibility. Indicators 1 and 2, which I will discuss next, did not depend on students being able to refer to a professional audience or purpose for the advanced lab report. However, in order to receive a "high" ranking for Indicator 3, students needed to connect lab report conventions to professional purposes of interpreting data and/or sharing results. For Indicator 3, students who referred to classroom purposes only would receive a ranking of "low awareness."

Indicator 1: Referring to Reader Needs to Explain Lab Report Conventions

Only six students explicitly connected their awareness of the reader's needs with the conventions of the lab report. Robyn and Barbara drew on their experience as readers of scientific papers to explain specific conventions they had observed or used themselves. Robyn introduced sub-headings within each of the traditional sections of her lab reports, noting that scientific journals do this, and it had been helpful to her as a reader.

> *Robyn, an AB student*
> Robyn: I also find it helpful - and I don't always see people do this - but I thing it is a good idea. Most journals do but to have subheadings. It is just very helpful when you are looking through the paper.

Barbara referred to reader needs when explaining why she had to focus narrowly on facts in her lab reports. Many students had characterized the lab report as "focused on facts" when comparing it to writing in the humanities. Unlike the others, however, Barbara gave a rationale that was more rhetorical than ideological.

> *Barbara, an AB student*
> Barbara: You can't just say whatever you want to say... Everything has to be focused.
> Joleen: Why do you think that is?
> Barbara: Because it is very specific. Like if you are looking at one specific thing, nobody cares about everything else. ...If I am reading a paper, I don't want to like have to dredge through lots and lots of information that has nothing to do with really pertaining to what I am looking for.

Likewise, Nishan, Liz, and Sean also connected lab report conventions to audience needs and expectations. They each argued that readers might miss important information if the writer violated expected lab report conventions. In the following interview excerpts, Nishan and Sean were giving a rationale for avoiding first person pronoun use.

Nishan, a CiE student

Nishan: I would say if you are using "I" and "we," it is kind of like "I did this, "we did that." For a person who is trying to get to the absolute point of the paper, they don't care what you did. They don't care what the group did. They just want to know the facts... Joleen: OK

Nishan: So it kind of makes the reader skip that section and it might have been an important section...

Joleen: OK. Because the reader doesn't care about it and it gets in the way. And because it gets in the way, people might overlook what they should see

Nishan: Yep

Sean, a CiE student

Sean: No one cares that group 5 did this... They don't want to read a ton of stuff. Engineers hate reading... If it [the report] went on like this they probably wouldn't even read it. [They'd] just skip it... It is not like you have all day to read these.

Liz, answering my question about why conciseness is important, pointed out that following disciplinary conventions helps to establish a writer's "authority." Without using the term ethos, she was making the connection between generic forms and rhetorical purposes.

Liz, an AB student

Liz: you can't really beat around the bush because people won't read it. And [they will question your authority. If it takes a long time to get to what you are trying to say people are going to get bored or get and they are like "This person can't even write so why should I read this entire 10 page paper when really it could have just been four or five?"

Six students were ranked "high"[4] on Indicator 1. Barbara, Liz, Nishan, Robyn, and Sean used their understanding of the needs of a professional reader to explain different lab report conventions. I also included Nancy in this group because she referred to reader's needs at least six times during the interview. Her concern for the

[4] Relative to the other students I interviewed

reader tended to focus on the need for clarity and readability,[5] and so would have been appropriate for either a professional or classroom audience.

Indicator 2: Referring to Rhetorical Purpose to Explain Lab Report Conventions

For further evidence of student awareness of the rhetorical purposes of the lab report, I reviewed the interview transcripts for student statements that explained features of the lab report by referring to the writer's purpose or the function of the lab report. I found examples of students explaining lab report conventions by talking about the way research reports are used by readers and publishers. Other students talked about lab report conventions serving the writer's purpose of establishing authority in order to persuade readers or simply to present a credible argument. One student noted the variability that is possible within the genre in order to accommodate the purposes of a particular experiment.

Use of the Lab Reports

Sondra and Nishan's statements arose from their attempts to give a rationale for repetitive content that is required by the lab report structure. The excerpt from Sondra's interview reveals the frustration she felt regarding a particular lab report convention which seemed repetitive to her, and shows how the TAs helped her to understand the rhetorical purpose behind it.

For Sondra, reflecting on how lab reports tend to be used – in fact, how she had used research reports herself – helped her to change her mind about the repetitiveness entailed in the generic form of the lab report. She moved from a rule-based interpretation to understanding the rationale for the practice. Initially, she chafed at

[5] For example, when talking about the challenge of learning how to incorporate numerical data in her text, she explained the need to limit the amount of numbers in one sentence because otherwise "it just gets overwhelming to the reader."

having to re-phrase the same information in both figure legends and text, complaining that it was just an arbitrary rule made up by someone long ago. But with guidance from the TA she realized that the writer prepares a report to be read in different ways: by people skimming through the article's figures as well as those taking time for a careful reading of the full text.

Sondra, an AP student

Sondra: I was very frustrated... Cause I didn't understand. I was questioning the legends... having to describe what is seen in the picture even though I just described it in the paragraph above and then I discuss it later on. I just feel like it was so repetitive and I didn't get it. I was OK well I see these papers and it is just the way it is like someone long ago invented how to write a scientific paper and now the rest of us have to do it.

Joleen: You don't see any other reason for it to be that way?

Sondra: ...They [the TAs] explained it as when you are scanning a paper and you don't feel like reading the whole thing. You just read the graph and you just read what is below the graph, which I have done. When I don't feel like reading a whole paper for a class, I just read what is underneath it. It does make sense. It is just more frustrating when you are writing it. It is different from reading it.

Nishan also commented on the repetitiveness entailed in lab report conventions. However, he avoided the frustration Sondra experienced because he recognized a rhetorical purpose for following the convention. Nishan explained that the repetition built into the structure of the lab report allowed it to be used by multiple people for different reasons.

Nishan, a CiE student

Nishan: These are very repetitive so you can jump into any one section and you will know the purpose of the whole lab or the results of the whole lab. It is extremely repetitive... but that is the way they want it. So you can say, OK I just want to know the results. So you open up to the data results section and you know the results. Or you are the head of the company and you want to see the what the heck this file is from 10 years ago - they look at the abstract....So it allows everybody to open up to where they need to be and know exactly what happened.

A third example focused on the use of the lab report comes from Robyn's interview when she referred to publication practices to explain why scientific writing seemed to suppress the individual author's "voice or unique style." Robyn observed that the restrictions on scientific writing prevented writers from displaying "a unique style" or "voice." Yet she recognized that the stringent requirements for formatting lab reports resulted from more than just arbitrary rules. While Robyn's rationale was ultimately based on disciplinary values,[6] it also reflected her understanding of the rhetorical purpose for stylistic conformity, i.e. that journal editors and readers wanted published articles to have a consistent format.

> *Robyn, an AB student*
> Robyn: I have read a lot of scientific papers and journals and I think that if you peruse through a bunch of papers written by authors they are all the same format. They are all kind of written in the same Well, it used to be always the passive voice and now they are written in the active. They all could have been written by the same person so... I don't really see the availability of being able to translate your voice or your unique style into scientific writing
> Joleen: I wonder why that is?
> Robyn: Just because when you publish for a journal they have very specific guidelines they want all their papers to be set up the same way just for consistency. And they have their editors [who] want it to all ...[to have] the same level of professionalism. Just to be consistent and for the reader I think.

Persuasive Effect of Avoiding First Person Pronouns

Sophia and James both believed that first person pronouns were not "formal" or "professional" enough for use in a lab report. However, they also both offered a rhetorical reason for avoiding them. Highly attuned to audience, both Sophia and James felt that avoiding the use of "I" would be more persuasive than using it. In James' words, "I think that if you go in there without using 'I' and 'we' that you are stating it

[6] in this case, the shared belief in the collaborative, incremental growth of scientific knowledge

with more authority...people may disagree, but I am not going to give them a way to." Sophia was more tentative, but made a similar claim, "I didn't want to put myself into it because I feel that that weakens the argument almost." James' statement in particular seems to be based on the tacit recognition that objective observation of reality cannot be easily disputed. This might be the source of the "authority" he ascribes to third-person prose, though he does not express that explicitly.

Citing Sources

Eight students responded with rhetorical reasons when I asked them about the citation practices used in lab reports. I had intended the question to probe their comprehension of the ideological effects of this convention, but these eight students focused more on the rhetorical impact of citing sources. They did not mention the collaborative nature of scientific inquiry or any other beliefs and values that are the ideological underpinnings of this practice. These eight students gave answers like Cynthia and Zoe, who explained that citing other research enhances a writer's credibility.

Cynthia, an AB student

Cynthia: I think it is important because if you are going only on your experiment, it is very easy for others to say "this is one experiment, there is a good chance that it is wrong, or there is a certain aspect that is wrong so it could come out completely different." So showing that other people have done like studies and have had similar or different results kind of shows that it is a possible conclusion, and it is not a completely made up experiment

Zoe, an AP student

Zoe: Because the more citations you have and the more legitimate they are, then the more likely your paper is to have credibility...And the more your paper is cited, the more credible your paper is... So it kind of makes your data and your evidence and your hypothesis... seem more real and more substantial regardless of whether it was or not. [laughter] ... If you use a well-cited author it is more likely that

somebody else who is reading your article might have read that and will be "Oh so this guy knows who that is. Maybe I should use their work"

Purpose of the Experiment

Sherry noted that the writer could "tweak" the lab report format to suit the kind of experiment that had been performed. She compared the guidelines (or rubric) for writing a lab report to the guidelines an art student might follow when learning to draw. As an artist or writer gains experience, they learn to depart from the guidelines to accomplish specific purposes.

Sherry, an AB student
Sherry: ... For every paper you do everything is slightly different... It is different the order you do it in. They [the TAs] say it is all the same, but it does slightly differ for everything on where you put something, what you are going to say, and how you are going to analyze it ..
Joleen: ...Your point is ...the particular experiment you have done affects how you write the report
Sherry: Yes. There are basic guidelines but those basic guidelines - like with drawing - there are guidelines. But after a certain point, forget the guidelines do whatever you want.....sort of like with writing, too. But this [lab reports] in particular, there are guidelines you gotta follow, but sometimes you got to tweak them a bit depending on what you are actually writing about at the time.

Summary

Eleven students made statements that I interpreted as connecting the rhetorical purpose of the lab report with its conventions. Among the group of students who referred to the use of the lab report, Nishan and Robyn showed high genre awareness on other indicators in addition to this one. Sondra, on the other hand, did not. In fact, her interview excerpt showed how the TAs helped her to make the connection between the way a research report is used and its organizational conventions. Sondra's experience suggests that explicit instruction can foster genre awareness.

The other statements that resulted in a ranking of high" for Indicator 2 were made in response to a question intended to elicit evidence of awareness of ideological effects. The fact that students responded to a question aimed ay ideology by talking about rhetorical purpose may indicate that students are better prepared to consider rhetorical purpose than they are to grasp ideological effects. I will explore this idea further in Chapter Five.

Indicator 3: Comparing the Advanced Lab Report to Introductory Reports

The statements that constitute the third indicator of students' awareness of the rhetorical purposes of the advanced lab report were prompted when I asked students to compare the advanced lab report to lab reports they had written in previous, introductory courses. I wanted to find out if students perceived that those earlier lab reports were didactic whereas the advanced lab report included the professional purpose of communicating knowledge. This was the only indicator of awareness of rhetorical purpose that allowed me to rank student responses as high, low, and "no awareness."

Most students in all three courses I observed had taken introductory physics courses, and most of the Zoology students had taken introductory chemistry courses as well. The purpose of lab reports in those courses was primarily to enhance students' understanding of course material. The emphasis was on "writing to learn" scientific concepts rather than on "learning to write" disciplinary discourse. For example, the instructions for lab reports in Physics I and II explained, "Your lab report is different from a typical technical report or research paper because there is nothing novel about your work. You are doing what many others have done before" (p 6). Students were

told to describe the experiment and what it demonstrated in the introduction to their reports (p 6). In their discussion and conclusion section, they were to relate their results to previously known values, spell out any major difficulties encountered during the experiment, and do a thorough listing of possible sources of error (p 7). The focus of the physics lab report was for the student to demonstrate that they understood the experiment and what their data meant.

Likewise, the Writing Guide for Chemistry Lab Reports indicated a similar learning-focused purpose. It emphasized concepts and did not even mention data or results, stating "Your lab report will give you an opportunity to think in detail about the principles investigated and then explain them to others in writing. Hopefully, this will help you better understand the concepts introduced in the classroom" (p 1). The Written Lab Report Objectives for the Survey and Mapping course taken by all first year Civil Engineering students described the purpose of the lab reports this way: "First and foremost, the lab report should provide you the opportunity to take the time to pull together, for yourself, the concepts covered in that lab" (p 113).

The written guidance provided to students showed that the introductory lab reports were a classroom-focused, didactic genre. In contrast, the advanced lab report assignment in all three classes I observed was more of a hybrid. Certainly it was a classroom-focused genre because students submitted it for a grade. However, the conventions of the advanced lab were different from those of introductory reports because was it was modeled closely on professional research reports (in Zoology) or testing lab reports (Civil Engineering). The purpose of introductory reports was primarily learning. By writing them, students would consolidate and demonstrate their

understanding of the lab exercise. In contrast, the advanced lab report assignment in each of the three courses specified that it should be written for a professional audience. The writer's assigned purpose was to present the results of their lab exercise in a meaningful and efficient way for other professionals to use, hypothetically.

When I asked students to compare introductory and advanced lab reports, some did not seem to recognize any difference between them, while others showed greater awareness of the advanced lab report's knowledge-making purpose. I used the range of student responses to this question to group students into high, low and "no awareness" categories.

No Awareness: Little or No Difference Between the Reports

Students whom I considered to have the least amount of awareness of the rhetorical purposes of the advanced lab report perceived it to be the same as or quite similar to the reports they had written before. Nancy reviewed the lab courses she had taken and concluded that reports in Animal Physiology were "not different at all." Nina and Sophia (not quoted) also claimed that the reports they had written in previous courses were similar.

> *Nancy, an AP student*
> Joleen: How does this particular class relate to other kinds of lab reports that you have had to do?
> Nancy: the subject material is similar to Bio 411 and 412... But in those the lab reports weren't quite as involved. But the same sort of format...And for Ecology that was the same sort of lab report type set up. Let me think So many classes...
> Joleen: So does the writing that you have to do for this class seem like "Yes I know how to do this. I have been doing it for a while"?
> Nancy: Yes
> J: Not new and different for you?
> Nancy: Not at all.

Nina, an AP student
J: You told me you have taken biology and chemistry. How are these reports similar or different compared to those?
Nina: They are pretty similar to the reports I have written before.

Sherry's response centered more on her efforts to satisfy the requirements in each course. As a result of her focus on the classroom context only, she envisioned the lab report as a consistent genre across all of her classes. What she saw as changing was not the purpose of the lab report, but her own ability to perform it "properly."

Sherry, an AB student
Sherry: I wasn't really good with lab reports. I don't know when that changed but pretty much I have done lab reports from first semester on... I wasn't as good then But I learned how to. Through the years in the different classes I have learned a couple of the different kinds of writing like... How you do... a lab report properly for like one kind of class versus another... I have become better at those like different sections what you put in them and how to cite. And now I am working a lot on the detail stuff like when you have a table you have your little paragraph about it above and when you have a figure it is underneath.

Low Awareness: A "More Professional" Report

At the next level of awareness, students recognized that the advanced lab report was different, but they did not identify it as a difference in purpose. Instead, they focused on ways that the advanced report was more challenging. Some, like Ginny, labeled it as "more professional." Others emphasized that the advanced lab report was longer, more detailed, more specific, or required more complicated graphs.

Ginny, an AB and AP student
Joleen: So how does the writing in these classes compare to other ones you have taken. Is it similar?
Ginny: In these classes? Because the lab reports are like the professional kind, they are definitely more intense and they definitely take a lot more time. Like a lot of times in my other classes just be like oh answer these questions, short answer. They'd be really easy. These ones are a lot harder.

High Awareness: Interpreting Data and/or Sharing Results

Students with a high awareness of the rhetorical purpose of the advanced lab report could explicitly describe one or more ways that it functioned like a professional report.

A New Role. A few students included in this grouping focused on their changed role as writers (compared to previous reports). Anya and Sean talked about how writing these reports was like doing the work of a scientist or engineer. Max explained that his interest in the lab experiments contributed to this change. Sean definitely saw the advanced lab report as different from introductory ones, but he recognized that they still were not identical to reports used in the field.

Anya captured the difference in purpose between the reports. She went beyond observing that the advanced lab reports were "stricter" and recognized that in Animal Behavior she was writing as a scientist who was producing knowledge to share with other scientists.

> *Anya, an AB student*
> Anya: I took biology and I did fine on all those lab reports. But this one definitely is a lot more stricter and pickier. Like I guess the other ones they didn't want you to pretend that you were a little scientist. But this one is like "Oh you have to write like you are really writing for other people to actually read and think about."

Max's interest in the content and the "applicability" of the lab exercises distinguished the advanced lab report for him from earlier, introductory ones.

> *Max, a CiE student*
> Max: They are a lot more involved you have to know a lot more about the topic. Like before in physics and chemistry, they didn't really apply to anything that I would care about... It was just really boring to tell you the truth. But - with Materials classes - a lot of those are interesting like testing concrete and all that. It's like really applicable.

Sean agreed that the advanced lab reports were different in purpose from the introductory lab reports. However, based on his summer work experience with civil engineers who were using the same kinds of lab data that the students were learning to produce, Sean recognized ways that the advanced lab report was still "like a school lab report" compared to those used in the field. In the field reports Sean had seen, the introduction, procedures, and apparatus sections seemed irrelevant and were not used.

> Sean, *a CiE student*
> Sean: These are a lot more intense, bigger, graded a lot harder. But I like it ...because they... treat you as if you were like a consulting engineering firm... They want you to write it like if you were in real life like at the engineering firm...This is not like physics 2 when you could write it 3 hours before it was due and be "Alright, it's good enough"... You had to pay attention [in this course] and you actually had to do a little research and you have to reference stuff, which I've never had to do that in a lab report before.... It's interesting. It's intense, how you kind of work in a group as it is in real life. And I kinda noticed that a lot of them were similar to some of the stuff
> Joleen: that you had seen [on the job?]
> Sean: Yeah. Like when we did the sifting aggregate first lab. They [his summer employer] would take dirt samples ...and they wanted to know the aggregate size... It came out in kinda of a similar type report.
> Joleen: You've seen those reports?
> Sean: Yeah. [Though] in a way they weren't like. As ours [the ones he writes for class] are written out more as still like a school lab report. Like procedure, conclusions, picture of an apparatus. Those [on the job] you like knew what it was. It was dirt... they'd didn't have those things. They do it so much, you don't really have time to be like "Oh, this was the apparatus." They just wanted to know the results basically and the conclusion. ...

Sharing Results. Nishan and Paul were both aware that the purpose of the advanced lab report was not primarily to demonstrate learning. Nishan's description of it made it clear that learning was involved, but that engineering students were learning to perform the professional purpose of producing data for others to use. Similarly, Paul

summed up the purpose of the advanced lab report in Zoology as sharing knowledge with others, just like the published research report.

Nishan, a CiE student

Nishan: These are easier than surveying labs but harder than the majority of the labs we have done...The grades are really rough on everybody because they want to make sure that we can do this report five years from now when we are in the workplace and when ...we are actually doing something like this where we just did the research and now we have to get the results to someone.

Paul, an AP student

Paul: The point of one paper is just to express... what I investigated, what I thought by doing this experiment... This paper's value is the result part because you want to tell the people after you like "that is what I did. I already did this experiment in this environment. If you want to do that again, you can follow my instruction and do that again but... based on my knowledge that is my interpretation of this graph or this result."

Situating Results. Rob and Zoe recognized that a key difference in the advanced lab report was that they needed to compare their results to the published work of other scientists and engineers. At first, Rob sounded like students who were simply describing the relatively more demanding requirements of the advanced lab report, saying "They are more detailed and specific." But he went on to show more awareness of rhetorical purpose by explaining that in the advanced lab report, he had had to compare his findings with "standardized, accepted values" for the first time. Zoe made this perception even more explicit, explaining that a new purpose of the advanced lab report was to connect her work in the teaching lab to published knowledge in the "real world."

Rob, a CiE student

Rob: These are a lot more detailed and specific. [pause] We've never really had to check up with standardized data or accepted values, never really had to compare our stuff to accepted values before. These are just a lot more in depth... After you actually do the lab and you have

> your data and results, there is still a lot of work to do...That does add a whole nother level of credibility to your report.

Zoe, an AP student

> Zoe: You have to know what you are talking about. So having to look up other references and read through them and actually pay attention to them, you can get a sense of what is actually going on in the real world and how it compares to what you do in the teaching lab.

Interpreting Data. Finally, students with the most explicit understanding of the rhetorical purpose of the advanced lab report talked about how the thinking that they had to do to write it was qualitatively different from that needed to write the introductory reports. They realized that their role as writers was different, and that this entailed more responsibility for choosing relevant content for the report.

While Ginny (quoted above) pointed out that earlier reports consisted of answering questions, Heather went a bit farther and attempted to articulate what the writer of the advanced lab report must do instead. When she said, "You actually have to write the abstract and the introduction..." I think she was getting at the idea of invention. In the advanced reports, the writer must decide what is relevant to say and how to say it, whereas in previous reports, the questions provided by the instructor did that work.

Heather, an AP student

> Heather: They [previous lab reports] have always been more structured. A little more, "OK you need to just answer these questions in your introduction" or "in your discussion just answer these questions." So that is pretty much what I did.... This [Animal Physiology] I think is probably the first class where I have had to do more scientific writing as opposed to answering questions. You actually have to write the abstract and the introduction and all that kind of stuff... It took me a lot longer than I thought it would to write down the facts and the figures and that kind of stuff because you actually have to get it right. You have to look it up and know what you are talking about.

Like Heather, Liz sensed that even though the format was the same as in the introductory lab reports, she had to do something different with her writing in the

advanced ones, something she said was more like writing in English classes. Yet she struggled to find words for the meaning she was trying to express.

Liz, an AB student

Liz: This is more a literature of science than actually writing science cause to me this is more a paper. It is not a lab report. This is a scientific paper not a lab report. Lab reports to me are organic chemistry and biochemistry and microbiology. This is a paper that I do for my lab which is animal behavior. That is how I think of it. [pause] ...How do I explain this? I pulled a lot more from English than I did from science. I mean, I pulled a lot from the scientific journals that I read, but it is very different writing a paper for chemistry and chemical reactions because I have plenty of experience with that. But we weren't really allowed to be articulate and be like literary about it... I am trying to find the right word.... There is just so much more to write about a behavior than there is about a chemical reaction... So it is kind of the same format but to me. I can't really explain it. I don't know why

Taylor, I think, articulated the idea that Liz was reaching for. In the advanced lab reports students must not just present their data and show they understood the scientific principles used in the experiment. They must also interpret the data and show how it related to other relevant knowledge in their field. Zoe, Rob, Max, and Sean all touched on the idea of sharing findings and situating them within other publications, but only Taylor and Paul talked explicitly about the writer's responsibility to interpret data in the advanced lab report.

Taylor, an AP student

Taylor: It [writing in this course] is definitely more in depth than anything any science classes I have had so far.... but I like it cause I think that, as Win said, that his purpose was in giving us all these lab reports was just to get us more and more comfortable with the process of cranking out decent sounding scientific papers. I have always had lab reports due, but not that were as interpretive. Organic chemistry lab reports took forever, but they were just answering questions. They were not interpretive. This left a lot more on our shoulders to interpret the results.

Summary

When I asked students to compare the advanced lab reports to those they had done in previous classes, most said they were distinctly different. However, only half of them identified the difference as having to do with the rhetorical purpose of the report. I used responses to this question to identify eleven students as having relatively high awareness of rhetorical purpose, and four as having "no awareness." Based on this one question alone, I cannot conclude that the students I placed in the "no awareness" group did not understand the purpose of the advanced lab report. As Sherry demonstrated, students who focused on the classroom would not see a difference between the two kinds of lab reports and so would be ranked as having "no awareness" on this indicator. I see the continuum I created as a way of showing relative differences in explicit knowledge of the purpose of the report among the group of students I interviewed. Compiling my rankings of students for all of the indicators described in this chapter is more instructive than looking at any one particular question.

Conclusion

In this chapter I have attempted to address the first half of Devitt's definition of genre awareness, i.e. whether study participants saw the conventions of the lab report as being shaped by its rhetorical purposes. All but two students, Nina and John, showed at least some awareness of rhetorical purposes. Nineteen out of the 24 interviewees had at least one ranking of "high" on Indicators 1-3. Nishan, Robyn, and Sean demonstrated the highest awareness of rhetorical purposes, with three "high" rankings each. Nishan and Sean were ranked "high" for each of the three indicators, while Robyn made two

comments that were included in Indicator 2 and one for Indicator 1. Table 3.1 summarizes the findings discussed in this chapter.

Table 3.1

Student Awareness of Rhetorical Purposes

	Summary of Rankings			Indicators		
	High	Low	None	1	2	3
Nishan	3			H	H	H
Robyn	3			H	HH	
Sean	3			H	H	H
Liz	2			H		H
Max	2				H	H
Pam	2				H	H
Zoe	2				H	H
Sondra	2	1			HH	L
Sophia	2		1		HH	N
Taylor	1					H
Paul	1					H
Rob	1					H
James	1	1			H	L
Sherry	1		1		H	N
Anya	1					H
Heather	1					H
Barbara	1	1		H		L
Nancy	1		1	H		N
Cynthia	1				H	
Frank		1				L
Ava		1				L
Ginny		1				L
Nina			1			N
John						

The interview excerpts included in this section show that more students could articulate a professional purpose for their lab reports than could envision a professional reader. This observation captures a point of intersection between the overlapping social contexts for the assignment. Students could imagine a hypothetical purpose for their

writing, but they were well aware that it would be the TA who would evaluate how effectively they had achieved that hypothetical purpose. Nevertheless, as I will discuss further in Chapter Five, some students chafed at the TA's requirements because they believed that the intended professional audience might have different or more flexible standards. Like Sherry's comment in this chapter about "tweaking" guidelines, some students used their awareness of the professional context to resist the demands of the classroom audience. In contrast, other students seemed to have no interest in understanding the reasons behind lab report conventions, and they relied entirely on the TA's prescriptions and proscriptions to guide their writing.

James, Robyn, Nancy, Nishan, and to a lesser extent Sophia seemed to be the most thoughtful about the impact of their writing choices on readers. Robyn, Nancy and Nishan referred frequently to the reader as they discussed their lab reports. James was keenly aware of the how language choices might influence the reader, and he provided examples and analogies of how writers might achieve similar purposes in different ways when the social context was different. Sophia also was highly focused on meeting the expectations of her readers, and she reported that she enjoyed her work as an editor of a student research publication where her main goal was to help student authors revise technical reports to appeal to a general audience. Among these five students, James, Robyn, and Nancy were extremely successful students and they received top grades for their work. Despite their rhetorical skill and strong academic performance, James, Nancy, and Sophia gave little evidence of genre awareness during the interviews. Their rhetorical skill helped them to do well in the classroom context, but did not guarantee

that they would develop an explicit understanding of why particular rhetorical choices were effective or suited to a particular context.

CHAPTER IV

STUDENT AWARENESS OF IDEOLOGICAL EFFECTS

In this chapter I turn from rhetorical purposes to consider the other half of Devitt's definition of genre awareness, that is, to describe the ways in which students demonstrated "a critical consciousness of ideological effects of generic forms" (192). First I briefly review some beliefs and values that are embedded in lab report conventions, and then discuss the extent to which students seemed to be aware of these beliefs and values, using interview excerpts to illustrate my claims.

Three questions proved to be especially fruitful for prompting students to talk about their understanding of the values and beliefs that shaped the lab report conventions. These included direct questions about the conventions of avoiding first person pronouns and of citing other research or laboratory standards. The third question asked students to compare writing lab reports to writing other kinds of assignments in other courses.

The disciplinary values and beliefs reflected in these conventions include a belief in the objectivity of the scientist, as well as the view of science as a collaborative endeavor, and the belief that scientific knowledge is built up incrementally over time.

Table 4.1

Values Embedded in Science and Engineering Writing

Objectivity, neutrality of the scientist/observer; truthfulness. This entails: -lack of bias; no manipulating of data to show a desired result -focus on object of study, not the observer -anyone performing a particular experiment should get same results
Simplicity and elegance in theory and explanation
Precise, accurate, concise communication

Table 4.2

Practices and Beliefs Embedded in Science and Engineering Writing

Knowledge-making in science and engineering is a collaborative endeavor
Scientific knowledge is built up incrementally; Individual work exists within a web of previously existing knowledge and on-going research
Experiments are replicable – anyone doing them should get same results
Knowledge claims are tentative and subject to modification and correction as a result of ongoing research
Predictable structure of a research report facilitates communication; it represents a shared way of carrying out communication
Publication establishes credit for discovery

In response to direct questions about lab report conventions, students showed an awareness of ideology that ranged from not having much at all, to being able to make a tentative connection between the convention and a belief or valued practice. None of the students made a clear and confident statement about the values and beliefs embedded in the conventions, and it seemed that very few, if any, of them had ever considered such a question before.

Indicator 4: First Person Pronoun Use in Lab Reports

Responses to the question of why science writers might avoid first person pronoun use was the most intriguing question because students tended to have strong opinions about this convention even when they could give no rationale for following it. In

contrast, students were better able to explain the reasons for following the citation practices used in their lab reports. In addition, I gathered more complete information about student perception of first person pronoun use. I did not ask about citation practices in six of the interviews, but students commented on first person pronoun use in all 24 interviews and in 108 surveys.

The question about first person pronoun use was also interesting because this convention was presented differently in the three courses I observed. First person pronoun use was strongly discouraged in Civil Engineering, discouraged in Animal Physiology, but supported by the professor in the Animal Behavior course. One of the Civil Engineering TAs explained to me, "It is probably the strongest thing that we stress is do not use the first person." When I asked him why first person pronouns would not be appropriate in a lab report, he replied, "It certainly is not very professional sounding ...I really don't [pause] I'm not sure. It's definitely one of the major criteria though."

In Animal Physiology, the guidelines for lab reports implied that the reason for this requirement was to achieve a formal style in the report. Page six of the guidelines, under the heading "Last but Definitely not Least," specifies that "the writing style should be a formal, 3rd person, past tense style. Do not us we, our, they, first names, etc. No familiar terms." Nevertheless, when providing formative feedback on the first lab report of the semester, one of the TAs repeatedly crossed out the infelicitous phrase "This experiment tested..." and suggested instead "We tested..." or "The experiment we conducted tested..." When students included an occasional first person pronoun in an Animal Physiology lab report, the TAs did not mark it as unacceptable. However, in Civil Engineering reports, the TAs deducted points if they found any first person pronouns.

In Animal Behavior, the professor orally encouraged the use of first person pronouns in the lab reports, but no written guidelines were distributed. None of the TAs in any of the courses liked the use of first person pronouns, and even in Animal Behavior, both TAs told me they avoided the use first person pronouns in their own writing. Lennie said he would use them "when it was suitable," but he could not explain how he distinguished such circumstances. "I couldn't even give you an example, but I just kinda know it when I see it, I guess. Or at least I think I know it when I see it." The other TA, Mary, explained her preference by referring indirectly to the value of objectivity, explaining, "Using the active is the way to go these days. I personally still like the passive as it sounds better ... When you start seeing a lot of "we" --"We" I can handle more than "I"-- ...I feel like all of the sudden it is not so objective. You are putting a person behind it." The Animal Behavior TAs knew that the professor recommended the use of first person pronouns, but in the voluminous comments they wrote on student drafts I collected, the TAs never suggested changing even an awkward passive construction to the active form using a first person pronoun.

Responses to Survey Questions about First Person Pronoun Use

Not surprisingly, a survey of all students in the three courses showed that students in Animal Behavior were the most aware that avoiding first person pronouns was not necessarily a rule of scientific writing. Table 4.3 compares survey responses of students in the three courses I observed.

Table 4.3

Response to Survey Questions About First Person Pronoun Use (FPP)[1]

	Percent of Respondents That Agree		
Statement	A Behavior	A Physiology	CiE
A. Avoiding FPP is a rule	58%	88%	96%
C. FPP use should be OK	25%	16%	9%
D. Avoiding sounds professional	72%	80%	92%
E. FPP can make concise, clear	28%	16%	35%
G. I know when to use FPPs	61%	76%	72%

Question: A	Avoiding FPP is a rule of scientific writing		
Course	Agree	Disagree	Not sure
Animal Behavior	58% (21 students)	31 (11)	11 (4)
Animal Physiology	88% (22 students)	4 (1)	8 (2)
Civil Engineering	96% (45 students)	4 (2)	0 (0)
Total	81%	13	6

Question: C	FPP use should be OK		
Course	Agree	Disagree	Not sure
Animal Behavior	25	58	17
Animal Physiology	16	68	16
Civil Engineering	9	78	13

Question: D	Avoiding FPPs sounds professional		
Course	Agree	Disagree	Not sure
Animal Behavior	72	20	8
Animal Physiology	80	16	4
Civil Engineering	92	6	2

Question: E	FPPs can make a sentence clearer and more concise		
Course	Agree	Disagree	Not sure
Animal Behavior	28 (10)	47 (17)	25 (9)
Animal Physiology	16 (4)	64 (16)	20 (5)
Civil Engineering	35 (16)	48 (22)	17 (8)
Total	28	51	21

Question: G	I know when to use FPPs		
Course	Agree	Disagree	Not sure
Animal Behavior	61	8	31
Animal Physiology	76	8	16
Civil Engineering	72	11	17

[1] Response percentages are based on 108 respondents to Question A and 107 respondents to Question E. (25 students in Animal Physiology, 36 in Animal Behavior, and 47 in Civil Engineering.)

Almost all of the Civil Engineering students (96%) agreed that it was a rule, and 88% of Animal Physiology students also agreed. Despite the professor's encouragement of using first person pronouns, more than half of the Animal Behavior students (58%) also agreed that with the statement that avoiding first person pronouns was a rule of scientific writing (Question A on the survey). In response to the statement that using first person pronouns can make a sentence clearer and more concise, students in Animal Behavior were similar to students in Civil Engineering with only one third of them agreeing with the statement. Only four students in Animal Physiology (16%) agreed that first person pronouns could improve sentence clarity. One explanation for this finding is that Animal Behavior and Civil Engineering students were more likely than Animal Physiology students to have taken a technical writing course that would have covered this concept.

Responses to Interview Questions about First Person Pronoun Use

Interview responses also reflected student preference for avoiding first person pronouns. Civil Engineering students branded it as unprofessional, and none would consider using them in their reports[2]. Even among the Animal Behavior interviewees, all of whom told me they knew using first person pronouns was acceptable, only five of the nine actually used them in their reports. Of these five, one told me that she would prefer not to use them. In Animal Physiology, only four of the nine interviewees told me they were open to using first person pronouns, though they all said they tried to avoid using them in their lab reports.

[2] However, I did find first person pronouns in the first report of the semester written by Nishan's group.

Student responses to the interview question about first person pronoun use can be grouped into three main categories: those that provide no clear rationale for the practice, those that make a tenuous connection between disciplinary values and the convention, and finally those that articulate – even if indirectly – a belief or value as a reason for the practice.

When asked, "Why avoid using first person pronouns in your lab report?" seventeen out of the 24 students interviewed initially responded with "I don't know." However, many went on to explore possible explanations as we talked about the issue. Most of the interviewees can be grouped in the intermediate category of having some awareness of how the disciplinary value of objectivity is represented in author-evacuated, third person prose.

High Awareness: Indirect Statements about Objectivity. Only five students explicitly connected the convention of avoiding first person pronouns with the researcher's desire to establish an ethos of objectivity. They pointed out that not using first person pronouns avoids suggesting to the reader that the report's findings might be subject to bias or "human error." These five students varied in how fully they described this connection. Taylor and Nishan did little more than point to the link between pronoun use, objectivity, and the ethos of the writer, while Robyn and especially Frank explained the connection in more detail. Paul explicitly connected pronoun use with the goal of presenting objective truth in science. For Paul and Frank, rules about pronoun use were less important than the ethical principle that scientists must present data honestly.

Tayor, an AP student

Taylor: I wouldn't want to say "we designed an experiment" because it is supposed to be kind of an impersonal description of the facts and the results, not "we did this and then we accidentally did this…"

Nishan, a CiE student

Nishan: If you keep saying "I did this and I did that" it is not really as formal as saying, 'Because of this machine, we got this results.' It is kind of saying, 'I kind of messed up using this machine.' So you make it either your own error or the lab error in some cases.

Robyn, an AB student

Robyn: Uhmm because it is scientific... Maybe it is just more of a sense of human error and you are just supposed to be removing yourself from it because you are supposed to be conveying the facts and the findings, and not trying to editorialize.

Frank, an AP student

Frank: There might be a blur between what your experiment said and what you are saying.... That is really easy to do in ecology. It is a really soft science sometimes and it is really hard to get solid data. And you might say a little too much about what you think is going on... You can over emphasize what you believe and kind of make the data fit that. It is real easy to do that in ecology... It is probably better to say "I think this" if you are going to editorialize or whatever, rather than being forced to be passive voice or not making "I" statements and kind of concealing it in the experiment.

Paul, an AP student

Paul: Maybe yeah it is a personal preference. Some professors like "I" and "we." They don't like too objective. Yeah, because this is the first class I was told to write to avoid "I" and "we."... [another] professor was not that strict about "I" and "we." You can write whatever. But the idea is you have to be precise. You have to be accurate. What you are saying has to be consistent with your results. ... It is what it is. If your result is not good, you don't want to correct them into good... The truth is truth, you know, it is objective. We can put in some ideas like our own opinion to interpret the data, but the data itself is right no matter... in what way you try to explain it. But the result is the result. You do not want to change the result. You can interpret it in a different way but... the paper's value is the result part... You want to tell people the truth. That is science.

Paul distinguished between presenting the data and interpreting it. He was aware that the convention of avoiding first person pronouns reflected a belief in objective observation, and he himself held the belief that scientists can collect data that represent objective truth. However, I credited Paul with "high" awareness not because of what he

believed, but because he connected language conventions with their ideological effects. Considering the question of pronoun use led Paul to discuss epistemology and the ideology of scientific practice, which set him apart from most of the students I interviewed.

Low Awareness: Hinting at Objectivity. The majority of students gave reasons for avoiding first person pronouns that hinted at the value of objectivity without actually naming it. They would describe what the lab report should be or not be using words that implied objectivity, such as "detached" or "not personal." Or, they would talk about what the report should do ("focus on experiment") or the reader's needs ("They don't care who did the experiment"), both of which are predicated on the value of objective presentation of data.

Statements by Max and John began with the idea that being "professional" is not appropriate in lab reports. Thinking further, they went on to articulate a corollary of a belief in objectivity: that the person doing the experiment should not affect the results. Pam made a similar point, though she approached it from the belief that experiments should be replicable.

Max, a CiE student
Max: When you include words like that it just kind of sounds like you are being personal with the reader which you try to avoid
Joleen: OK so why would that be?
Max: I don't really know. I picked that up somewhere. My teachers said it at some point. [pause] I don't know it's just kind of defining that it is a person and not that it was an experiment done. That somebody was there actually doing it and I guess that is not what they are after.

John, a CiE student
John: The first person is a no-no in technical reports.
Joleen: Why do you think it is?
John: I want to speculate on that. I don't know. I think I wasn't sure I understood it before we started the lab.... But when you compare

> something with the first person pronoun in it and something that doesn't have the first person in it ...It [the sentence with first person pronouns] is personal... It's like we are talking about what we did, not about what happened to the specimen and what you are really interested in is what happened to the specimen. Yeah, that's why.

Pam, an AB student

> Pam: When you are writing a scientific paper and you are trying to describe what you did and why it happened, it is supposed to be repeatable so someone else could do it. So it is not just like "we did this." It could have been anyone.

Sherry recognized that a writer can take different "points of view." She distinguished the personal from "a science-y point of view," which may be her language for an ideology based on objectivity. Her tolerance for the use of "we" indicated an awareness that this convention was changing, but she seemed to see this as a rule change rather than a change in disciplinary beliefs or values. Notice she attached the moral value "bad" to the use of "I."

Sherry, an AB student

> Sherry: Maybe it is because the "I" is too personal and then could mean either you are thinking only from your point of view and not from the science-y point of view. I don't know. "We" seems to be OK. But "I" seems bad.

Liz, a student in Animal Behavior, pointed out that following the professor's encouragement to use first person pronouns made writing more difficult because she then had to find other ways to create formality. She came very close to identifying the underlying value of objectivity when she said that the writer still "has to sound distant."

Liz, an AB student

> Liz: It [avoiding first person pronouns] was easier actually. Cause it is harder... to be proper with "we" because you still have to sound distant but you have to include that you were the one to do it.

Zoe explained that this convention was changing. She realized that the change emphasizes the action of the researcher, but she stopped short of connecting it to changes in beliefs about knowledge-making (i.e. ideology).

Zoe, an AP student
Zoe: I feel that either of them could be right because I have seen them both ways. But probably using "we designed" rather than "an experiment was designed" because it's more personalized and that is what they are trying to get us to do now. In older papers they say "an experiment" but in more modern papers they are saying "No, you actually did it, take credit for yourself"... To show that this isn't something we found laying on the floor... Like we actually thought about this and did it.

No Awareness: No Reference to Disciplinary Beliefs and Values. Altogether eight students made no reference to disciplinary beliefs and values when explaining why they avoided first person pronouns in their lab reports. Their reasoning tended to rely on rules they had been taught in school. In some cases, students had so completely accepted the rule that the use of first person pronouns in science writing seemed wrong to them and made them uncomfortable.

Rob's statement illustrated a frequent rule-based response to my question, saying that he avoided using first person pronouns because that is what he had been taught to do.

Rob, a CiE student
Rob: I have always been taught to steer clear of it. I don't really know why.

Ava, another Civil Engineering student, was aware that she would lose points on her lab report if she uses first person pronouns (it will "nail you"). But she also gave the most frequently-cited rule-based rationale for avoiding first person pronouns: they are

unprofessional.[3] Actually, Ava did not say that the *language* was unprofessional. Instead, she connected first person pronoun use with the writer's identity.

> *Ava, a CiE student*
> Ava: You can't get away with writing "I" in your introduction. It's those things that are going to nail you and it is going to make you look unprofessional.

Faculty in the Civil Engineering courses I observed frequently exhorted students to "be professional." Ava's statement and others like it indicated that students might see "being professional" as an end in itself without having an explicit understanding of the values and beliefs they are embracing as they take on a "professional" identity.

Sondra and Sophia used the word "formal" in the same way that Ava used "professional." For example, Sondra, like other students who gave this response, saw "being formal" is a standard that she must satisfy.

> *Sondra, an AP student*
> Sondra: You are not supposed to use any form of like "I, we, they." Anything like that... I honestly don't know why. Formality I guess.

In addition, Sophia reacted negatively to seeing first person pronouns in a lab report even though she did not offer a reason why the lab report "has to be formal." The rule was enough of a reason for her.

> *Sophia, an AB student*
> Sophia: I just don't like the way it feels when I read it. I can't really explain it. It makes it too informal to me... A lab report has to be formal.

James and Barbara also struggled to articulate a reason for their choice, yet they still expressed a strong negative reaction to seeing first person pronouns used in scientific

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[3] In the survey, 82% of all respondents agreed with the statement "Avoiding 'I' and 'we' sounds more professional." 13% disagreed and 5% were not sure. Responses varied between the three courses with agreement percentages of 72% in Animal Behavior, 80% in Animal Physiology, and 92% in Civil Engineering. These percentages were quite similar to agreement with the statement "Avoiding 'I' and 'we' is a rule of scientific writing."

writing. Barbara repeated Sherry's condemnation of first person pronoun use as "bad." Like Ava, they seemed to see the "third-person style" as part of their own identity as scientists or engineers. Note how Barbara claimed "I don't think like that."

James, a CiE student
James: Something inside me just says it's unprofessional to do it that way and I am not sure why. ... if I was the professor that's exactly how I would do it, too. I would penalize people pretty heavily for using "I" or "we" just because I feel like it is unprofessional.

Barbara, an AB student
Joleen: I know you don't like first person pronouns. Can you tell me why?
Barbara: Because it's annoying. Because I don't think like that. Like "I, we" – No, No bad! ..It is just like the way I was taught in high school and the way that I have gotten used to writing my papers.

Ginny also seemed to connect avoiding first person pronouns with her identity as a scientist. When thinking aloud about why seeing first person pronouns in her textbook seemed "weird," she suggested that avoiding them might be "an instinct scientists have." Enrolled in both Animal Physiology and Animal Behavior, Ginny knew that using first person pronouns was acceptable in some scientific publications, but she seemed perplexed about why it bothered her to see it used in a textbook.

Ginny, an AB and AP student
Joleen: Another thing you mentioned ...is about using "I" and "we"...That that is out for these [reports]. And do you have a sense of why that would be?
Ginny: Maybe I did understand a little bit when in my Animal Behavior [textbook] he's like "I did research on this." Like the author of the book! And I am like "Wait that doesn't sound right." Maybe that is like an instinct or something scientists have, like "Don't use it." But in my Animal Behavior book he uses that... even in the middle of the chapter! Like, it is not just in the introduction. So I think it is kind of weird at times when he says that... in a textbook. You always think like "Oh that's factual" but I guess it is a little [pause] I don't know if it is really that much more interesting. Maybe if it was just a book that he wrote but not in a textbook. I don't think it is appropriate for a textbook, and maybe that's because he it should be more formal. He

> should make it interesting, but when he uses "I" and "we" it's kinda [trails off]. Maybe I am just not used to it in a textbook.

Ginny had difficulty accepting that a scientific writer might use first person pronouns when presenting "factual" information. She expected to find the author's personal views in the introduction, but not in the "factual" chapters. Ginny guessed that the textbook author might be using first person pronouns to make the content more interesting to student readers. She seemed to associate first person pronouns with story-telling and entertainment. In the end, she concluded that the narrative nature of first person pronouns was suitable for other kinds of books, but not textbooks.[4] Her unspoken assumption might have been that facts derive from impersonal, objective observation, not from the story of a person's experience. She did not have the awareness to put this tacit understanding into words, but instead resorted to the descriptor "formal."

Students like Ava, Sondra, Sophia, Ginny, Barbara, and James (and 82% of the survey respondents) may have fully embraced the value of objectivity embedded in the conventions of the lab report without being aware of it. Their explanations for avoiding the use of first person pronouns support Devitt's argument that "by the time one has learned to perform a genre, one is already inducted to its ideology" (196). In fact, I was astonished that two students and one of the Zoology TAs found the active form of a sentence to be confusing and more difficult to read than the passive form of the same sentence.

I made this discovery about how disciplinary conventions can affect reading comprehension during the portion of the interview when I showed participants the

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[4] In Haas' paper "Learning to Read in Biology," the student she studied, Eliza, likewise tended to view science textbooks as "autonomous" and "unconnected to human agents" (61). Although Eliza gained an increasingly rhetorical understanding of scientific discourse over the course of her college career, even as a senior her recognition of the rhetorical nature of scientific texts was "somewhat uneven" (69).

following sentences and asked them to select the one that would be most appropriate for a lab report. The sentences are identical except for the first four words. Nina, Nancy, and Animal Physiology TA Roger all indicated that statement "a" was more difficult to comprehend than statement "b."

a. We designed an experiment to determine if consuming orange juice raised human blood glucose more than oranges or light orange juice.

b. An experiment was designed to determine if consuming orange juice raised human blood glucose more than oranges or light orange juice

Nina, an AP student
Nina: The first one is confusing I am still not really sure what it is saying. And it is not very professional.

Nancy, an AP student
Nancy: This one ["a"] I had to read through a second time just to. Let me read it again. Oh I know because "an experiment was designed." I like that better than "we designed."

Roger, an AP TA
Roger: I'd say [prefer] "b." It flows better it seems to me. I had to read "a" a couple times. That is my reason - just clarity.
Joleen: Do you have any reaction to the fact that this has a "we" in it? Does that bother you at all?
Roger: I didn't even notice the "we."

These responses suggest that when style conventions such as first person pronoun use are learned as arbitrary rules, they may nevertheless still function within a genre to transmit ideology. Devitt argues that "if teachers are to help minimize the potential ideological effects of genres, they must help students perceive the ideology while they are encountering the genre. Once they are full participants in the genre, resistance becomes more difficult (some say futile) and choices become less visible (some say invisible)" (196). For most of the students in the "no awareness" group, using first person pronouns did not seem to be a choice; it was viewed as "unprofessional," or even "bad." They

expressed no awareness that avoiding first person pronouns reflected a belief in the scientist or engineer as an unbiased, objective observer of reality. As a result, they might be unprepared to question this belief or to consider alternative approaches to knowledge-making.

Summary

Without quoting all 25 interviewees, I have presented the range of answers students gave in response to my question about first person pronoun use, and I have suggested that these responses can be ranked according to the relative extent of genre awareness they indicate. Students from all three courses were included in the group who connected this convention most explicitly to the value of objectivity. This "high awareness" group included Nishan from Civil Engineering; Frank, Taylor, and Paul from Animal Physiology; and Robyn from Animal Behavior. Likewise, the eight students in the "No Awareness" group were distributed among all three courses: James, Rob, and Ava from Civil Engineering; Sophia and Barbara from Animal Behavior; and Sondra and Nina from Animal Physiology. Ginny was a student in both Animal Behavior and Animal Physiology.

As I will show in the next section, student awareness of the rationale for avoiding first person pronouns did not necessarily predict a similar awareness of the reasons for other kinds of conventions. For example, Rob had relatively little awareness about first person pronouns, but he made one of the more perceptive explanations about why students must cite other sources in the lab reports.

Indicator 5: Citation Practices in Lab Reports

The question of citation practices did not come up in every interview because, unlike the pronoun use question, it was not included in the list of example phrasings reviewed with every participant at the end of the interview (See Tables 2.7 and 2.8 or Appendix D). Asking about citation practices came up naturally in 18 of the 24 interviews as we reviewed a sample of the student's writing.

Perhaps because citing other research was a convention students had practiced in first year composition and in other kinds of writing assignments, no interviewees responded to the question "Why do you need to cite other papers or standards in your lab report?" with "I don't know," the reply that was so common to my question about first person pronouns. However, just as in responses to the question about pronoun use, student answers to the citation question could be grouped into three categories according to the extent to which they reflected an awareness of the connection between the practice and disciplinary values and beliefs. Only two students, Ava and Ginny, answered the citation question in a way that indicated little or no awareness of disciplinary values. The majority who addressed this question talked about giving credit to other writers. As explained in Chapter Three, many of these students tended to focus on the rhetorical impact of this convention rather than on its ideological implications. Students with the most awareness of ideological effects explained this practice by at least pointing to a belief in the collaborative, incremental nature of knowledge-building in science and engineering.

No Awareness: Avoiding Plagiarism

The two students with the least awareness focused on the principle of giving

credit to other authors whose ideas they used in their reports. However, rather than relating this principle to disciplinary values, they explained it as a rule that must be followed. Ava and Ginny invoked the rule against plagiarism (or stealing) as their reason to cite sources.

> *Ava, a CiE student*
> Ava: I guess you could maybe even go as far as plagiarism maybe if you've learned something from something else taken that information.

> *Ginny, an AB and AP student*
> Ginny: I think it is important to cite other peoples' ideas, not just steal them.

Low Awareness: Giving Credit

Barbara, Anya and Nina gave the positive formulation of the rule against plagiarism, and in doing so referred to disciplinary values to explain the practice. They were aware that publication established credit for discovery in the professional social context, and that this disciplinary ideology created the need to cite sources in their lab reports. Barbara's statement was typical of these three students.

> *Barbara, an AB student*
> Barbara: Especially in the introduction you never find out the information for yourself... I didn't do the research to figure that out. But Kemp 2006 apparently did. He is the one who found it out and wrote a paper on it. So it is just kind of respect and giving credit where it is due.

High Awareness: Collaborative, Incremental Knowledge Building

Students who exhibited high awareness of the ideological effects of citation practices were Liz, Frank, Sherry, Taylor, and Rob. They indicated that individual laboratory work exists within a web of previously existing knowledge and on-going research. Their answers reflected the discipline's value of collaboration and belief in the incremental growth in scientific knowledge. Rob mentioned citation respects priority of

discovery, but he further explained that citing others served to position research results within the discipline's knowledge base. Likewise, Sherry talked about relating lab results to "everything else in the field." Frank touched on how competition and funding drive citation practices. Frank initially stated that disciplinary beliefs could explain citation practices, but went on to suggest that funding might also drive it.

> *Rob, a CiE student*
> Rob: You have to make sure the source is credible... When you compare your data to other people's data that is commonly accepted throughout the engineering public, it just shows that what you are doing is relevant to what other people have done and the results that you've got are in the right ball park.
>
> *Sherry, an AB student*
> Sherry: I suppose it regulates us and It keeps us all on the same page... normally when you do a discussion section you want to make sure yes this isn't out of the blue It can be connected to other things... People did similar studies. They got results similar to me, ...or they got this different results but that could have been because of this...
> Joleen: It helps the reader see
> Sherry: How it relates to everything else in the field and specifically your subject and topic.
>
> *Frank, an AP student*
> Frank: Probably the belief in scientific method that things need to be repeated I guess. One of the things in the life sciences that kind of contradicts what I just said is that there isn't a lot of repetition so you have to kind of like meld together a bunch of things that other people did because you are not going to get a grant to do the same thing. ... You can't go out and do those 26 experiments yourself; you have to cite them... because they got the money for it.

Liz and Taylor gave answers that were similar to Sherry's. Of the five students who talked about collaborative knowledge building in their explanation of citation practices, Frank stated most clearly that disciplinary values and beliefs are reflected in discourse conventions.

Summary

The values and beliefs supporting the practice of citing other relevant texts are not especially distinctive in science or engineering compared with other disciplines. The students I interviewed had been taught to cite sources in a variety of courses beginning in high school. Despite the familiarity of the practice, students gave a range of responses to my question. Students in the "High Awareness" group were Frank, Liz, Rob, Sherry, and Taylor; those in the "No Awareness" group were Ava and Ginny.

Indicator 6: Comparing Lab Reports to Other Kinds of Writing

Just as student responses to questions about style conventions can be placed at different places along a continuum of awareness of ideology, students also exhibited a range of awareness of underlying ideology when I asked them to compare writing lab reports to writing in other disciplines. The "other" discipline that most students commented on was English because for many of them, the only writing intensive courses they had taken outside of the sciences were first year composition or high school English. When asked to compare lab reports to other kinds of writing, students readily listed differences in style, writing process, and content. However, merely observing differences is not the same thing as recognizing that differences in language use results from differences in disciplinary values and beliefs. Several students seemed to have an awareness of these underlying values, but they struggled to articulate them. A few students came very close to explaining that disciplinary values led to differences in ways of writing.

Even though some students demonstrated more awareness of disciplinary beliefs and values than others did, ranking student responses to this question was problematic.

For one thing, in this part of the interview I did not consistently prompt students with a "why question" about the differences they observed. Secondly, the question seemed to be challenging for students. Those who referred to disciplinary values and beliefs did so in a very indirect way. None explicitly stated that the differences they observed were the result of disciplinary differences in ideology. My rankings of student responses to this indicator reflected my ability to discern the connections students seemed to be making between ideology and genre conventions. For these reasons, I did not rank student responses to this question into categories of high, low, and no awareness. However, I did indicate which students I believed came closest to considering beliefs and values as they talked about writing in different disciplines.

The benefit of this more open-ended comparison question was that it allowed students to express their understanding of the lab report genre in a way that was not focused on specific conventions and that was not framed as specifically by me. The statements I have selected to include in this section highlight the differences between scientific and non-scientific disciplines that were most salient for students in this study. All students remarked that writing was different in different disciplines, but most did not seem to be explicitly aware of why these differences existed. This lack of awareness may contribute to a tendency among science and engineering students to misinterpret or devalue knowledge-making practices in the humanities. Without the awareness that writing conventions are based on disciplinary values, students may assume that the conventions of their chosen discipline are simply "right" rather than socially constructed (and variable) over time.

In a few of the following examples, students seemed to disparage ways of knowing that did not conform to their perception of scientific knowledge making. They appeared to have constructed a dichotomy in which the conventions of scientific writing were identified as "professional" and "true" while writing in the humanities was labeled as "informal" and "making stuff up," i.e. false. I will discuss this observation further in Chapter Six.

When students compared writing lab reports to writing other kinds of assignments in the humanities (essays in English class, for example), several overlapping themes emerged. All the themes derived from three beliefs about scientific knowledge: (1) that it is established through detached, objective observation, (2) that it is built incrementally through collaborative effort, and (3) that to be accepted, it must validated by the scientific community. The most frequently observed dissonance between English and the scientific disciplines was summed up by many students as "fact versus opinion." For example, Animal Behavior student Liz contended that writing lab reports is "less opinion and more based on fact" than writing English papers. Students were sensitive to the tension between valuing individual perspectives, creativity, and humanistic ways of knowing on the one hand, and valuing objectivity and collaborative, incremental knowledge construction on the other even if they could not explain it in epistemological terms.[5] I discerned inklings of awareness of disciplinary values and beliefs in student statements about the kinds of claims they could make and the evidence they could use in their lab reports compared to their English papers. Students also commented on differences in the way language is valued in different disciplines.

[5] Leverenz, among others, has described how citation styles, for example MLA and APA, reflect these differences in disciplinary values. It is relevant to my study to note that students are usually taught to use different citation styles without any explanation of the ideological differences they represent.

I have arranged the following interview excerpts into four groups according to the disciplinary value or belief that was most relevant to the student's statement. If statements related to more than one value or belief, I tried to group them according to the one that received the most emphasis. Within each group, statements that merely pointed out differences in writing practices are presented first, followed by those that included attempts to explain why the differences exist.

Scientific Knowledge is Objective

In this group Anya, Rob, and Cynthia made observations that were rooted in epistemological differences between science and the humanities, but they did not come as close to explicitly connecting the differences they observed with ideology as Taylor did. Therefore in this group, I considered only Taylor to have demonstrated genre awareness.

For Anya, who as a sophomore was a relative newcomer to the discipline, avoiding the use of first person pronouns was a struggle. An additional hindrance to her lab report writing was that her strongest writing resource–her creative side[6]-was excluded because of the objective stance expected of lab report writers. Even though her ability to use language creatively was valued in other kinds of writing assignments, it seemed useless to her in writing lab reports.

> *Anya, AB student*
> Anya: For scientific writing the perspective of the person doesn't really matter. The personality can't come out. It's not supposed to be in scientific writing... How do I write something without including myself in it? It's tough.

Anya was aware of conventions that required a lab report writer to sound objective, but she did not reflect on why this was so.

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[6] Anya had observed during the interview that "[scientific journal articles are] so painful to read sometimes...because I could go to art school and there is an artsy, creative part to me. Scientific journal writing is the exact opposite. And it's like it's so bland and it's very straight to the point, but it's hard."

Cynthia and Rob seemed to have some understanding that the differences they observed between disciplines was related to values, but they were not able to articulate it explicitly. Cynthia responded initially to my question with the common "fact versus opinion" theme. Only when I followed-up on her statement did she distinguish between kinds of facts – those based on personal experience versus those established by peer reviewed publication. Rob had a similar intuition that what counts as evidence is different between English and engineering, but he only made that intuition explicit when I supplied the words.

Cynthia, an AB student

Cynthia: It [the lab report] is much more based on facts than [pause] Most of the writing I had done in high school was more opinion based, and things out of not scientific books and reading.

Joleen: OK. So the focus is on facts and data. Facts versus opinion ... The writing that you did [in] English... There were facts in that, right?

Cynthia: But most of them were personal facts more so than scientific journal articles. It was kind of like, "I think this way because of something that happened to me."

Rob, a CiE student

Joleen: I am assuming your AP [English] course was different from Materials. How would you characterize the difference between those kinds of writing?

Rob: I'd say they are both analytical but in a different sense. Engineering technical documents you have to be analytical in terms of like backing up what you say or explaining things so like using equations or explaining using examples, that type of thing. Whereas in literature it's more abstract or like. I dunno I am having a hard time explaining what I mean. It's more like ahh I dunno. I guess its more abstract I can't put a finger on it.

Joleen: What you seem to be saying here's what I understanding is that they are both analytical, but that what counts as evidence is different. Would you say that?

Rob: Yeah that's what I am trying to say. That's good.

Cynthia and Rob were both aware that the means of persuasion were different in English compared to science and engineering, but they did not connect this difference to ideology.

Taylor, a student who admitted that at heart she was more of a poet than a science writer,[7] attempted to explain why the conventions of the lab report could be so different from those of the genres used most often in the humanities. Initially at a loss for words, she began by observing that successful science students seemed to "look at things" differently, which touched on the idea of different ways of knowing in different disciplines. As she continued, she discussed the role of interpretation and intuition in the humanities, and implied that these were knowledge making tools. Finally, Taylor referred to the collaborative nature of knowledge-making in science and how that constrained a science writer. Her insights may have resulted from the depth of her experience in both English and Zoology; she felt that she belonged in both disciplines.

> *Taylor, an AP student*
> Taylor: Uhmm I [pause] It is hard. It is one of those things that I know the difference but to put it into words uhmm I dunno. I have friends who organic chemistry came so easily to them just because they have - the way they look at things. It is maybe more of a black and white versus a gray area. Philosophy and poetry ...is very much reader interpreted, and I like that. I can read all these works by all these philosophers and I don't have to agree with them.... You can draw on your own perspectives and your own experiences, where in science it is definitely a little more fact based... and the learning process I think is a lot more memorization than interpretation, for sure. Some of it is intuitive, but not that much. Learning cell function...is not something you can really draw on your own experiences for... But it [science] is a lot more information to know and to kind of keep on the surface.... You go on to zoology and all of the sudden you are asked to remember something you learned in freshman bio, some specific cell function detail. And that for me is hard - to keep this huge database of just

[7] When we discussed her literacy background and career goals, Taylor commented, "I have to have a scientific mindset for my major and for all the classes that I am taking. But deep down, I think I really, really, really prefer poetry analysis and I love books...."

> endless little facts. You can't just know one thing and then expand on that on your own

Though Taylor struggled to find words, she eventually was able to independently connect her sense of the difference between writing in English and in Zoology to approaches to knowledge-making that were valued and used in the two disciplines.

Scientific Knowledge is Built Incrementally through Collaborative Effort

Two themes mentioned by students seemed to point to the beliefs that scientific knowledge-building is a collaborative endeavor and that knowledge is built incrementally over time. I have characterized these themes as "focus on facts" and "you can't say whatever you want." Both themes reflected a writer's sense of being restricted by the expectations of disciplinary readers. In this group, Sophia and Barbara described the "focus on facts" characteristic of lab reports but did not explain why readers expected this. Frank's comment about what a lab report writer could say was subtly different because he referred indirectly to conceptions of knowledge within science.

Lab Reports Focus on Facts. Sophia and Barbara, both Wildlife majors, came close to discussing disciplinary beliefs about knowledge when they explained that a narrow focus on a specific, data-delimited topic was a distinctive characteristic of science writing. Other students also used the words "focused," specific," and "detailed" to describe lab reports. This belief in the primacy of the data reflected the values of objectivity and collaborative knowledge-making in scientific disciplines. It might be paraphrased as, "What matters is the data, and it belongs to everyone, not just to the researcher who publishes it." As Levernentz points out in her comparison of MLA and APA citation styles, disciplines in the humanities value authors – their ideas and even

their exact words – whereas disciplines in the social sciences (and presumably "hard" sciences also) "value data, often represented numerically" (191).

Sophia described scientific writing as "focused" and "specific," but did not attempt to explain why this characteristic was important. Several other students made similar statements.

> *Sophia, an AB student*
> Sophia: With science you have to stay really focused on one thing... In English you start in one place and you can kind of end up someplace else and that is OK....With English your ideas can flow and go where they will, but with science you have to really try and stay really focused on what it is that your that the topic is You have to stay really focused on a certain I don't know what the word is... It is just really more focused than English writing...

Barbara's initial observation about the difference between writing in Animal Behavior and writing in English centered on the way that the lab report writer was constrained by the expectations of the readers in her discipline. In Zoology, the writer is tied to the data and is expected to present and discuss it in a specific way. She is not free to say whatever she feels like saying, which Barbara believed was welcomed in English assignments. The sing song intonation that carried her words implied disdain for the less formal, personal approach valued in first year composition courses.

> *Barbara, an AB student*
> Barbara: [First year composition] is really informal and it is really like [sing song] "Oh how do you feel? What is your opinion?" whereas in science writing, you ... have to be really concise. You can't be too wordy. You can't just say whatever you want to say. You have to keep it focused on what you are thinking and ...on what the results actually show, [on] the experiment in itself.

After Barbara said that lab reports needed to be focused narrowly on the experiment and the data it produces, I prompted her to give a rationale for her claim. Her

answer highlighted the needs of a reader working within the vast expanse of published scientific knowledge.

Barbara, an AB student

Barbara: A lot of times in the introduction you can get talking about so much stuff and there are so many resources out there that you can just go on and on forever and you would always have stuff to support what you are saying. So some of it is trying to hold back [limit or focus] what you are looking at... Everything has to be focused

Joleen: Why do you think that is?

Barbara: Because ...if you are looking at one specific thing, nobody cares about everything else. Especially like a science like if I am reading a paper I don't want to like have to dredge through lots and lots of information that has nothing ...really pertaining to what I am looking for.

Barbara explained her observation in terms of rhetorical concerns of audience and purpose without referring to the underlying values of objectivity or incremental, collaborative knowledge-building.

Lab Report Writers Can't Say Whatever They Want. Frank was a senior who had enjoyed taking a series of "great books" honors English courses during his first two years of college, but he had not taken any upper level English courses since then. His first response to my comparison question began with the frequently mentioned theme that "you can say anything in English as long as you can back it up." However, he went on to explain that this approach was not appropriate for lab reports because the data must be presented in the context of other published research reports.

Frank, an AP student

Frank: You can read John Locke and then write a 20-page paper about what you think about it in humanities, and that is decent if you have a thesis...whereas in science writing you have to [pause] It's hard to say anything. You can't really say what you think. You have to say what all the experiments out there think.

I credited Frank with genre awareness because his reasoning hinted at the collaborative nature of knowledge-making in science.

Scientific Knowledge Must Be Validated by the Scientific Community

The belief that scientific knowledge must be validated by the community is an outgrowth of the belief that scientific knowledge is constructed in a collaborative, incremental way. It focuses on what counts as knowledge. When students talked about this idea they used the term "being right" rather than knowledge. One of the repeated themes among the interviews was that there is "more than one way to be right" in English, but only one way in science. The other theme represented in the following interview excerpts referred to knowledge as "stuff," as in "you can't make stuff up" in science. This was a frequent comment in all of the interviews, and I see it as problematic because of its negative connotation.

In the following group of excerpts, statements by Sean, Sophia, and Sherry illustrate ways that students described this idea of "being right" and "making stuff up" without trying to explain it. Liz is the only student I credited with having genre awareness because she talked about different disciplinary approaches to knowledge-making.

Only One Way to Be Right. Sean had a very difficult time trying to express his intuition that engineering majors "think a certain way" that is different from other kinds of students. I have edited and glossed the excerpt in an attempt to clarify the meaning I heard when he was talking.

Sean, a CiE student

Sean: If you're an engineer you're or an engineering major you kinda think this certain way for every class. Kinda like "writing works this way - this is how it works," and not be like "well it *could* be this [other way too]. Kinda like in psychology or something where you can argue your points if you have a good enough reason. Well, like

> this [lab reports] is just one way. So ...technical writing kinda has to be one way ...While in...[first year composition] Eng 401 you could write it however you want because as long as you back it up I guess. [His voice trails off. The meaning, I think is that as long as you can back up your argument, any claim is acceptable even if it is different from the claims others have made about the same topic.]

Sophia made a similar observation about how "being right" is viewed differently in science compared to in English. Like Sean, she did not attempt to give a reason for the difference.

> *Sophia, an AB student*
> Sophia: I think that people are more apt to think that they are right in English than they are in science. [laughter] Like with my thesis that I am writing right now... I don't know what [the filmmaker] is thinking, but I do know it is a fact that he used this many lines out of this many lines [of Shakespeare] in his writing. How that is interpreted can be different for different people ...I feel like people can think that they are right but for different reasons. Like in English everyone can be right but for different reasons. But in science I don't think that can happen.

Unlike Sean and Sophia, Sherry offered an explanation for the differences she saw between writing in English and writing in science. She may have recognized that the difference resulted from different approaches to knowledge-making, but she did not make that explicit. Sherry seemed to reject any approach other than the objective, empirical epistemology of science.

> *Sherry, an AB student*
> Sherry: A lot of the English stuff, too, is interpretation of things. And most of interpretation is ideology, it's BS, and it is whatever you want to say that sounds good. That is what most of interpretation is cause you don't know what the author intended. ...I think everyone in this college can just make things up when they analyze ...Everyone makes that up, and they are all right! I think that they [English instructors] focused a lot on doing that. I was like can we stop doing this? ... The first couple of times it might be useful - before we figure out that anything we say is right.

Sherry, who had not taken any advanced English courses, equated interpretation of literature with "making stuff up." She implied that knowledge must be validated by others in order to be accepted.

In Lab Reports You Can't Make Stuff Up. I include below a long excerpt from my interview with Liz to show that as she thought aloud about the differences between writing in science and in English, she eventually connected her observations to assumptions and beliefs about how knowledge is made in science. Liz began with the same claim made by others, that "you can basically say anything and make it right." Yet unlike the others, she explored the extent to which disagreement about facts is possible in scientific discourse as well. To pursue this idea, she provided an example from the crayfish lab to illustrate it, which may indicate that she found it difficult to express this abstract perception explicitly.

Her example helped me to see that what she and other students might have meant when they said "you can't just make stuff up" in lab reports. Liz seemed to mean that intuitive speculation about empirical observation was not acceptable in lab reports, but that this approach succeeded in English assignments. She took this idea further when, after considering the wide range of emotional inflection that is possible in English papers but not in lab reports, she said that science writers have "to conform." When I prodded her with a question, she connected this idea to disciplinary values and beliefs by suggesting that the collaborative nature of scientific knowledge-making might be the reason for this difference. Of course, her words were less explicit, but that is meaning I gleaned from her statement that if science writers do not conform to expected lab report conventions, then what they have to say "wouldn't be approved."

Liz, an AB student

Liz: English is a lot more opinionated and a lot more open in the responses because I know that **you can basically say anything and make it right**.... in high school because I was bored I would take the most inane idea... and if I said it out loud without any support everyone would be "no it's wrong." But as long as I had support behind it and it made sense to the teacher, it was right and I got an A. .. You can make it work... because it is all opinionated. And this [the lab report] is less opinion it is more based on fact. I mean there are different ways of interpreting the facts that's right which I have actually come across in a lot of the papers that I have read. They are like "this study did this but we think..."

Joleen: Taking the same data

Liz: The same data and then taking their data and relating it back to the data from the other paper and saying "This is what we think and this why we think it is right ..." But it is not like you can say whatever as long as you have proof behind it. Like I think that literature is looked at in such a different way because it is so open to interpretation. Like someone will take one sentence and think one thing, and someone else will take the same sentence and think something totally different thing about it. But with science and with scientific writing, you can't [pause] you can look at the facts different ways. But in the end it is still just the fact. You can't get away from it.

You can't say "well we think the crayfish did this because they were angry at each other." Yeah they are angry at each other. Obviously. They are showing aggression. But what does that have to do with anything? **You can't just make stuff up**. Which in English - I shouldn't say this because I did it a lot - you can make stuff up and basically bullshit papers that you have five minutes to write and they can't really say "no" to it. You don't get great grades on it but you can still pass it for something. I know I am awful. With English I bullshit a lot. ...Yeah like with science you can't really vary that much. With English and literature it is a wide range. At least that is my opinion...

You can't really write in a sarcastic tone in science writing, which I love to do in English. You can't really be nonchalant. You can't really be familiar ... You can have a pissed off tone, "You're wrong and I'm right and that's it because of this data." [But in] English you can do whatever you want... It's like playdough. You can pull it apart, put it together. Like in science you have a more rigid shape to it. **You have to conform to what everybody else expects to see**. Like the IMRD [the format of introduction, materials and methods, results, discussion] You have to have certain things in the materials and methods. You have to write something in the introduction

Joleen: What goes in there is expected

Liz: Right and you can't really say "While I was sitting down to have coffee I thought about this and..." You can't say stuff like that You can't make it what is the other word for it?
Joleen: Informal?
Liz: Informal!... yeah you can't really take an informal tone You have to make it formal You have to make it professional. With English everything is professional. Well not everything
Joleen: There is a very wide range
Liz: Right There is a very wide range....
Joleen: So in science you have to conform. ...Do you have a sense of why that would be?
Liz: I don't know. I think it is because it's expected. Because if someone did something different **it wouldn't be approved** because all these people are so used to seeing the same stuff over and over and seeing the same type of article. Different ideas obviously, many good ideas. But it is always in the same manner....

Language

In addition to awareness of different approaches to knowledge-making in the humanities and in science, two students touched on the ways that language itself is valued differently in different disciplines. Civil Engineering students Sean and James believed that in the humanities, language was valued for its aesthetic appeal, whereas in engineering, the language used must not distract from the message. James expanded on the aesthetics of language more fully than Sean did. Because James attempted to explain his observations by invoking disciplinary ideology, I considered his statement to be evidence genre awareness.

Sean focused on the needs and expectations of the reader, but pointed out that language that "sounds nice" was not important in lab reports while it was valued by readers in English courses. Sean explained that rhetorical purpose influenced the kind of language that is appropriate in a genre.

Sean, a CiE student
Sean: I feel like in labs you do more technical writing. It's not like 'We went to the park. We did this. We had a talk about.' It's more like

> 'This happened.' ...[In a lab report] you don't care that it sounds nice... In just normal English 401 you can add all the extra stuff. People will want to read it for that. People don't want to read this. They just want to know the information and move on to continue work. In a way, time is money.

James began by noting that well-written technical reports can be aesthetically pleasing, but went on to note that such crafting was infrequent because it was not highly valued among pragmatic engineers who were satisfied with "what works" and what is "efficient."

> *James, a CiE student*
> James: I think that a technical document if it doesn't have kind of nice language and continuity and like fluidness to it can be extremely dry. I find that the better ones that do use more literary aspects. I am basing this off of other professionally written articles that I've read... My girlfriend - she'll write history papers and ...she's got Microsoft word open and a thesaurus open. I feel like she does that a lot more than I do. I wouldn't say that our vocabularies are any different, but I think that with the humanities field she worries a lot more about having... unique language.... I don't think in engineering we really focus on that as much. ...Engineers are very practical people. We want what works efficiently, and so we're not going to go through a thesaurus looking for the most unique best word. We are going to take the one that fits. And the one that works.

Sean and James catalogued differences in how language is used in different disciplines. They were not explicitly describing beliefs about language or speculating about the nature of language. However, they did recognize that language can be viewed in different ways, which would give them insight about the ideological effects of language in genres. James came closest to articulating such an insight.

Conclusion

As Leverenz and others have argued, a discipline's values regarding knowledge making are embedded in genre conventions (188). My data showed that students who had not received explicit teaching about genre awareness were not well-prepared to talk about

the beliefs and values that had shaped genre conventions. Students may not have been fully aware of the values they were embracing as they participated in the genre of the advanced lab report.

In this chapter I discussed three indicators of genre awareness. Two were based on direct questions about a specific genre convention, while the third was an open-ended question that allowed students to suggest key differences between genres in different disciplines and to speculate about the reasons for those differences. Responses to my question about first person pronoun use indicated that students who were learning the genre could begin to own and even cling fiercely to language conventions without being aware of the values they represented.

Compared to my question about first person pronoun use (Indicator 4), students could talk more readily about the values and beliefs related to citation practices (Indicator 5). Students seemed better prepared to think about *why* they followed particular citation practices. This greater awareness may have resulted from the emphasis given to teaching about citation practices in previous writing courses. As students learned about this convention in first year writing courses or even in high school, they were likely to have had ample opportunities to discuss with instructors and peers the reasons for this practice and possibly even the values related to it. Pronoun use, on the other hand, seems to have always been presented as a rule with little accompanying discussion.

When students compared different kinds of writing, I noted patterns of similar statements that related to disciplinary values (Indicator 6). However, the students making these statements did not explain the differences in terms of disciplinary values and beliefs. A few began to talk about ideology when I asked for more explanation of the differences

they described. I concluded that students were not used to connecting disciplinary beliefs, values and practices with the conventions they followed in their writing.

Overall, study participants seemed to be less aware of the second part of Devitt's definition of genre awareness[8] (ideological effects) than they were of the first part (rhetorical purposes). Four students, Ava, Ginny, Sondra, and Sophia, did not receive a ranking of "low" or "high" for any of the three indicators of ideological effects. Of these, Ava and Ginny were ranking as having "no awareness" on Indicators 4 and 5. The most awareness of ideological effects was demonstrated by Frank and Taylor who were each ranked "high" on all three indicators. In addition, Liz was ranked "high' on Indicators 5 and 6. Nine students had a ranking of "high" for at least one indicator, and these were evenly distributed among Indicators 4, 5, and 6. Even though my impression was that students had a better understanding of the reasons for citation practices than for first person pronoun use, the number of students with high rankings was the same for these indicators. These findings are summarized in Table 4.4.

[8]) Devitt's definition of genre awareness is "a critical consciousness of both rhetorical purposes and ideological effects of generic forms" (192),

Table 4.4

Student Awareness of Ideological Effects

	Summary of Rankings			Indicators		
Name	High	Low	None	4	5	6
Frank	3			H	H	H
Taylor	3			H	H	H
Liz	2	1		L	H	H
Nishan	1			H		
Paul	1			H		
Robyn	1			H		
Sherry	1	1		L	H	
James	1		1	N		H
Rob	1		1	N	H	
Anya		2		L	L	
Cynthia		1		L		
Heather		1		L		
John		1		L		
Max		1		L		
Nancy		1		L		
Pam		1		L		
Sean		1		L		
Zoe		1		L		
Ava			2	N	N	
Barbara		1	1	N	L	
Ginny			2	N	N	
Nina		1	1	N	L	
Sondra			1	N		
Sophia			1	N		

CHAPTER V

RANGE AND SOURCES OF PARTICIPANT GENRE AWARENESS

After separating student perceptions about ideological effect and rhetoric purpose for detailed analysis, I will now bring these observations together in order to assess the overall genre awareness of individual students that was demonstrated by their comments about the advanced lab report. In this chapter I summarize student responses to each of the six indicators described previously, and combine each individual's responses to identify the students with the highest and lowest overall rankings. I then compare these groups of students with each other in order to discern experiences or social characteristics that might contribute to the development of genre awareness.

Synthesizing the Two Components of Devitt's Definition of Genre Awareness

The responses of students for each indicator that were discussed in Chapters Three and Four are summarized in Table 5.1. I was able to rank student genre awareness as relatively high or low for the indicators that were responses to direct questions (Indicators 3, 4, and 5). Most students had the opportunity to respond to these questions. The remaining three indicators depended on statements that students might make spontaneously during the interviews. Ranking these statements would not be appropriate because I did not elicit them from all of the interviewees. In other words, the students listed under Indicators 1, 2, and 6 would all be considered to have relatively high genre awareness.

Table 5.1

Summary of Student Responses to Six Indicators of Genre Awareness

AWARENESS OF RHETORICAL PURPOSES

Indicator 1: Referring to Reader Needs to Explain Lab Report Conventions
Barbara, Liz, Nishan, Robyn, Sean, Nancy

Indicator 2: Referring to Rhetorical Purpose to Explain Lab Report Conventions
Use of Reports
Nishan, Robyn, Sondra
Persuasive Effect of Avoiding First Person Pronouns
James, Sophia
Citing Sources Builds Ethos
Cynthia, Zoe, [Not quoted: Max, Pam, Robyn, Sean, Sondra, Sophia]
Purpose of the Experiment
Sherry

Indicator 3: Comparing the Advanced Report to Introductory Reports
NO DATA: Cynthia, John, Robyn
HIGH: Interpreting Data and/or Sharing Results
Anya, Heather, Liz, Max, Nishan, Pam, Paul, Rob, Sean, Taylor, Zoe
LOW: A "More Professional Report"
Ginny, [Not quoted: Ava, Barbara, Frank, James, Sondra]
NO AWARENESS: Little or No Difference
Nancy, Nina, Sherry. [Not quoted: Sophia]

AWARENESS OF IDEOLOGICAL EFFECTS

Indicator 4: Responding to Direct Question about First Person Pronoun Use
HIGH: Indirect Statements about Objectivity
Frank, Nishan, Paul, Robyn, Taylor
LOW: Hinting at Objectivity
Anya, Max, John, Liz, Sherry, Pam, Zoe [Not quoted: Heather, Nancy, Cynthia, Sean]
NO AWARENESS: Rule-Based Reasons
Ava, Barbara, Ginny, James, Nina, Rob, Sondra, Sophia

Indicator 5: Responding to Direct Question about Citation Practices
NO DATA: Nishan, James, John, Paul, Heather, Nancy
HIGH: Collaborative, Incremental Knowledge Building
Frank, Rob, Sherry [Not quoted: Liz, Taylor]
LOW: Giving Credit to Other Authors
Barbara [Not quoted: Anya, Nina]
NO AWARENESS: Rule-Based Reasons
Ava, Ginny

Indicator 6: Referring to Ideology When Comparing Lab Reports to Other Writing
Taylor, Frank, Liz, James

The student rankings presented in Table 5.1 are grouped as they were in Chapters Three and Four, with three indicators for awareness of ideological effects separated from the three for awareness of rhetorical purposes. The information in Table 5.1 can be reorganized in order to compare individual students according to their performance on all of six indicators, thus synthesizing the two components of Devitt's definition of genre awareness. Two ways of reorganizing the data are shown in Tables 5.2 and 5.3.

Comparing the statements I selected as indicators of genre awareness did not provide an unequivocal ranking of participants. First of all, the evaluation of the statements was based on my subjective understanding of the students' meanings. Secondly, as shown in the tables, no individuals were consistently high or low for all indicators. A contributor to this variability may have been the lack of consistency between interviews. The only direct question that I am sure that every interviewee had the opportunity to answer was Indicator 1 about first person pronoun use. I did not have an equally effective direct question about the rhetorical purposes of the lab report.

Because every interviewee provided a statement about first person pronoun use and these statements tended to reflect awareness of ideology in an unambiguous way, Indicator 1 was the strongest of the six indicators of genre awareness. For this reason, I considered giving it more weight as a primary indicator of genre awareness, or even using it as the only indicator. However, when I used it to index responses to all indicators, several drawbacks of this approach emerged. This arrangement, shown in Table 5.2, placed five students in the "high awareness" group, eleven in the "low awareness" group, and eight in the "no awareness" group.

Table 5.2

Individual Genre Awareness Sorted by Responses to Indicator 1

	Indicator 1	Total # of High Rankings	Total # of "No Awareness" Rankings
Frank	High	3	0
Nishan	High	4	0
Paul	High	2	0
Robyn	High	4	0
Taylor	High	4	0
Anya	Low	1	0
Cynthia	Low	1	0
Heather	Low	1	0
John	Low	0	0
Liz	Low	4	0
Max	Low	2	0
Nancy	Low	1	1
Pam	Low	2	0
Sean	Low	3	0
Sherry	Low	2	1
Zoe	Low	2	0
Ava	No Awareness	0	2
Barbara	No Awareness	1	1
Ginny	No Awareness	0	2
James	No Awareness	2	1
Nina	No Awareness	0	2
Rob	No Awareness	2	1
Sondra	No Awareness	2	1
Sophia	No Awareness	2	2

The main defect of this arrangement was that Liz, the only student to receive two rankings of "high" for each component of the definition of genre awareness, was grouped into the "low awareness" category. Likewise, Rob and James who each showed potential genre awareness with one "high" ranking for both components of Devitt's definition were also in the "low awareness" category based on Indicator 1 alone. These inconsistencies revealed that relying on only one indicator as a measure of genre awareness was problematic because there was too much potential for students to give an atypical

response to a single question. Given the exploratory nature of my assessment methodology, I would not give as much importance to a single ranking of "high" or "low" or "no awareness." However, the same ranking on two or more indicators would be more persuasive and would suggest a potential pattern rather than a random finding.

Within the range of rankings, the "no awareness" designation carried more weight than the "high awareness" designation. One reason for this was that there were fewer opportunities for students to be placed in the "no awareness" category. Out of the six indicators, only three[1] of them were stratified and included a "no awareness" group. Also, I interpreted student statements generously when looking for evidence of awareness. Unused to the kinds of questions I was asking about lab report conventions, students often struggled to put their thought into words. In response, even if a student's expression of their ideas was not crystal clear, I was more likely to give him or her credit for having awareness than I was to withhold it. Also, relatively few students were ranked in the "no awareness" category for any indicator. For these reasons, the "no awareness" ranking was more meaningful than the high awareness ranking.

Range of Genre Awareness Among Interviewees

Instead of relying on one indicator, I based my assessment of genre awareness on indicators of both components of Devitt's definition, and sought to include two or more "high" rankings for each component. I defined genre awareness empirically as a ranking of "high" for two or more indicators for each of the components of genre awareness (ideological effects and rhetorical purposes). Unfortunately, this standard was too demanding; only one interviewee, Liz, received at least two rankings of "high" for both

[1] Indicators 3, 4, and 5 were stratified into "high," "low," and "no awareness" groups.

awareness of ideology and awareness of rhetorical purposes. As a result, I relaxed the requirement and settled on a relativistic definition of genre awareness that was based on two criteria: the number of "high" rankings across all six indicators, and having at least one high ranking for each of the components of Devitt's definition of genre awareness. In this project, genre awareness was demonstrated if a student received more than two rankings of "high" among the six indicators, and if they had high rankings for both components of genre awareness (ideological effects and rhetorical purposes). "No awareness" was defined empirically as having two or more rankings of "No Awareness" among any of the six indicators. The range of genre awareness that I observed among study participants is shown in Table 5.3.

Table 5.3

Individual Genre Awareness Sorted by Total Number of High Rankings

	Total # of High Rankings	Total # of "No Awareness" Rankings	Rankings for Awareness of Ideological Effects		Rankings for Awareness of Rhetorical Purposes	
			High	No A.*	High	No A.*
Liz	4	0	2		2	
Nishan	4	0	1		3	
Taylor	4	0	3		1	
Robyn	4	0	1		3	
Sean	3	0			3	
Frank	3	0	3			
Max	2	0			2	
Pam	2	0			2	
Paul	2	0	1		1	
Rob	2	1	1	1	1	
Zoe	2	0			2	
James	2	1	1	1	1	
Sondra	2	1		1	2	
Sherry	2	1	1		1	1
Sophia	2	2		1	2	1
Anya	1	0			1	
Heather	1	0			1	
Barbara	1	1		1	1	
Nancy	1	1			1	1
Cynthia	1	0			1	
Ava	0	2		2		
Ginny	0	2		2		
Nina	0	2		1		1
John	0	0				

*No Awareness

According to my empirical definition, Liz, Nishan, Robyn, and Taylor demonstrated relatively high genre awareness. They each had received four "high" rankings, and at least one "high" ranking for each component of Devitt's definition of genre awareness. Four other students, Sherry, James, Paul, Rob, came close to meeting

the definition of genre awareness because each had one ranking of "high" for each component. At the other end of the scale, four students (Ava, Ginny, Nina, and Sophia) showed a relative lack of genre awareness because each received two rankings of "no awareness." Within this group only Nina and Sophia were ranked as "no awareness" for both components of Devitt's definition of genre awareness.

Limitations of Comparing High Awareness and "No Awareness" Groups

Before discussing the characteristics of students in the "no awareness" and high genre awareness groupings, I want to emphasize that the rating scale was relative, and that overall genre awareness among these students was low. A ranking of "high" did not indicate optimal genre awareness. Instead, the rankings in Table 5.3 showed how students compared to each other. Very few students made comments during the interview that fully exemplified Devitt's definition of genre awareness as a "critical consciousness of both rhetorical purposes and ideological effects" of the conventions of the advanced lab report. In particular, students showed little explicit awareness of the values and beliefs embedded in lab report conventions ("ideological effects"). Paul in Animal Physiology was the only student who explicitly connected any convention with the ideal of objectivity in science.

I also want to point out that I am making no claims about the totality of each student's understanding of the lab report genre. Genre awareness is an abstract tool that is independent of any particular genre; it is not knowledge about a particular genre. This study was not designed to thoroughly probe what the students knew about lab reports. Yet even my assessment of genre awareness is limited because the rankings were based solely on explicit statements the students made during a one hour interview on one

particular day. Subsequent interviews or longer conversations might have given students more opportunity to demonstrate the full extent of their genre awareness. In addition, the comparisons I am making between students do not reflect on their writing performance which I did not attempt to evaluate. All of the students who volunteered for interviews were receiving satisfactory grades in the course, so even those I ranked in the "no awareness" category were producing satisfactory reports.

The high genre awareness group and the "no awareness" group were similar in terms of major, age, gender, and year in school. The fact that there was only one male in either group is not surprising considering the gender distribution of the courses that I observed, my selection of students to interview[2], and the fact that each genre awareness grouping had only four students.

Potential Contributors to Developing Genre Awareness

To discern potential contributors to the development of genre awareness, I studied the student genre awareness profiles for patterns of association between students' previous experiences and their genre awareness ranking. I also considered factors that Thaiss and Zawacki had identified as contributing to disciplinary writing development in their larger study of advanced undergraduate writers across a range of disciplines.[3] I found potential associations between genre awareness and five kinds of experiences:

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[2] Most students in the zoology courses were female, and almost all of the civil engineering students were male. Because I included approximately equal numbers of interviewees from each course, it would be unlikely that more than one third of any group would be male.

[3] In comparing my study to Thaiss and Zawacki's, I am not suggesting that genre awareness is the same thing as disciplinary writing development. Factors that contribute to disciplinary writing development would not necessarily contribute to development of genre awareness. However, both studies collected student perspectives about disciplinary writing, and I find potentially fruitful parallels between our observations.

breadth of writing experience, mentoring, jobs or internships, writing confidence, and disciplinary identification. Table 5.4 summarizes my observations about these potential associations.

Table 5.4
Potential Associations Between Past Experiences and Genre Awareness

Past Experience	√ = Number of Students with the Experience	
	High Awareness Group	No Awareness Group
Breadth of Writing Experience	√√√ or 75%	√√ or 50%
Jobs or Internships	√√ or 50%	0
Mentoring	√√√ or 75%	0
Disciplinary Identification	√√√√ or 100%	√ or < 25%
Writing Confidence	√√√ or 75%	√√√√ or 100%

Thaiss and Zawacki observed that students who had done a significant amount of reading and writing in more than one field (i.e. double majors) could more quickly describe "differences and convergences" between writing in different fields, and "pinpoint how the methods of one field might be useful in meeting the exigencies of another" (169). However, in my study, breadth of writing experiences did not appear to be associated with genre awareness. There was little difference between the high and low awareness groups in terms of the breadth of their writing experiences. Three out of four students in the high awareness group and two out of four in the low group described excelling in English or the humanities before focusing their study on science. In fact, the only double major among the interviewees, Sophia, was in the "no awareness" group.

Having jobs or internships also was not strongly associated with genre awareness. None of the students in the low awareness group had had discipline-related jobs or

internships, and only two of the four in the high awareness group had. Even the additional four students with one high ranking in each component of genre awareness were evenly split between those who had had jobs or internships and those who had not. However, a different kind of disciplinary work experience did show a possible relationship with genre awareness. Students who had worked closely with a mentor on a writing project, frequently as part of an independent research project, were more often ranked as having genre awareness compared to those who had not had mentoring experiences. Three of the four students in the high awareness group described mentoring experiences while none of those in the "no awareness" group had been mentored. This finding is similar to Thaiss and Zawacki's observation that "third stage writers" (the most advanced group of undergraduates in their ranking scheme) repeatedly mentioned the importance of "teachers who took the time to respond in detail to their writing" (148).

The strongest association that I observed was between genre awareness and disciplinary identification. I evaluated disciplinary identification through both survey and interview data. On the survey, students ranked the extent of their commitment to their chosen field on a 4-point Likert scale. From the interview, I collected student statements about the source of their interest in the field, the length of time they had been interested, their reason for choosing their major, and the specificity of their career plans as evidence of their disciplinary identification. The pattern of association between my ranking of student genre awareness and my assessment of their disciplinary identification was the most consistent of the five possible contributors to genre awareness that I considered.

All of the students in the high awareness group showed strong disciplinary identification, and this pattern persisted among the group that had one high ranking in

each component of genre awareness. In the low awareness group, only Ava, the civil engineering major, was strongly committed to her field. Yet even Ava, unlike many of her classmates, did not have a clear idea of what aspect of the very broad discipline of civil engineering that she would pursue, and she did not have a specific career goal. None of the others in the "no awareness" group was sure of what she would be doing after graduation. This lack of disciplinary identification was unusual among the students I interviewed. Only three of the 24 lacked strong disciplinary identification, and two of them, Nina and Sophia, were in the low awareness group. The association between disciplinary identification and genre awareness that I found is consistent with Thaiss and Zawacki's observation that students who do not "become sufficiently invested in the discipline's academic discourses" may not advance to the third stage of writing development (110).

Finally, the most unexpected pattern I observed in my ranking of student genre awareness was that having high awareness did not correspond with confidence in writing ability. While three of the four students in the high awareness group were confident writers who were used to getting good grades, Nishan said that he "always had such a hard time with writing." Likewise, among the four students who had received at least one high ranking in both components of genre awareness (Sherry, James, Paul, Rob), two were confident writers and two were not. In contrast, all of the students in the "no awareness" group reported that they were confident about their writing skills.

Nishan's comments during the interview exhibited some of the strongest evidence of genre awareness, but he was possibly the weakest and least confident writer among all of the interviewees. Paul, who gave the most lucid and insightful explanation of the

rationale for first person pronoun use, was a native Chinese speaker who had only been in the U.S. for two years. Paul had good control of written English with only minor grammatical problems in his later lab reports. However, he identified translating Chinese thoughts accurately into acceptable English as his "biggest challenge" in writing lab reports. Other students who saw themselves as strong writers, such as Frank and James, were not ranked among the students with high genre awareness. Table 5.5 summarizes students' reports of their attitudes about writing along with their genre awareness rankings.

Table 5.5

Genre Awareness and Writing Confidence

	Number of High Rankings	Number of "No awareness" Rankings	Student Comments About Writing
Liz	4	0	"I have always loved writing.... most of the time writing was not difficult for me." –
Nishan	4	0	"I've always had such a hard time with writing."
Taylor	4	0	"I like to write... Composition has always just been easy for me"
Robyn	4	0	"I have always enjoyed writing, different kinds of writing, too."
Sophia	2	2	"One thing I am confident in is my ability to write. I am really confident because I do so much of it."
Ava	0	2	"Sometimes it [writing] is fun; sometimes it is annoying"
Ginny	0	2	"I used to get As and everything ...In my other school it was really intense, like honors English... It was hard but ... I liked it."
Nina	0	2	"I think I am a pretty good writer. Not so much for the lab reports but [laughs] But creatively I think I am a decent writer. "
Sherry	2	1	"Writing it up sometimes is torture to me."
James	2	1	"My writing always has been pretty good....it is something that has come naturally"
Paul	2	0	"My English level is behind other people."
Rob	2	1	"I feel pretty good and different styles of writing too... I guess it just comes easily to me."

At the beginning of this study, I had expected to find that students with the highest genre awareness would also be the most confident writers, but, as just described, I did not find that to be consistently true. I speculate that students who found writing difficult and yet persisted in majors requiring substantial amounts of writing may have gained genre awareness through their very struggle with language. Insecure writers Nishan, Paul, and Sherry all were quite committed to their majors. In addition, they had

all experienced personal success in work or other achievements related to their majors. Although they were not confident writers, they experienced success outside the classroom. Participating effectively in other social contexts may have contributed to their genre awareness, which is, essentially, understanding the mutual interaction between social context and genre.

General Observations About Student Genre Awareness

Overall, interviewees seemed to be more aware of the rhetorical purposes of lab report conventions than of their ideological effects. Nine students had at least two high rankings for awareness of rhetorical purposes while only three students had at least two high ranking for awareness of ideological effects. In addition, only five students (21%) did not have at least one high ranking for indicators of awareness of rhetorical purposes, while fifteen (more than 50%) students had no high rankings for awareness of ideological effects. A potentially significant finding is that among the nine students who had at least one ranking of high for ideological effects, all but one also had at least one ranking of high for rhetorical purposes. In contrast, among the19 students who had at least one ranking of high for rhetorical purposes, eleven had no corresponding ranking of high for ideological effects. This suggests that there may be a relationship between these two components. Awareness of rhetorical effects may contribute to or be a precursor of ideological awareness.

On the other hand, this difference might simply indicate that more students were familiar with rhetorical concerns or were more used to talking about rhetorical considerations of audience and purpose. Another explanation might be that the way I elicited and interpreted student statements led to more of them being characterized as

evidence of rhetorical awareness rather than of ideological awareness. I may have provided more opportunities for students to talk about rhetorical purposes during the interviews. The summary of student statements in Table 5.1 shows that larger numbers of students were included in the "high" category for indicators of awareness of rhetorical purposes than were included in any of the "high" categories for the three indicators of awareness of ideological awareness.

Understanding why students seemed to have greater awareness of rhetorical purposes than of ideological effects is also complicated by the possibility of interpreting student statements as evidence for both of these two components of Devitt's definition of genre awareness. For example, when Liz explained that, compared to English assignments, lab reports "must conform to what everybody else expects to see," I interpreted her statement as connecting genre conventions to the disciplinary belief that knowledge must be validated by the scientific community. In this case, I chose to see the statement as evidence of ideological awareness. However, I could also have interpreted it as connecting genre conventions to reader needs and expectations, and thus counted it as evidence of awareness of rhetorical purposes instead.

In addition to revealing the limitations of my assessment of student genre awareness, this observation raises the more fundamental question of whether writers need an explicit awareness of embedded ideology, particularly when it might be included less explicitly in their awareness of reader expectations and needs. Perhaps guiding students in the practice of analyzing the rhetorical situation, already a staple of standard composition pedagogy, is sufficient. A difficulty arises, however, when considering this possibility because of the dual social context of classroom assignments modeled after

professional genres. Then the question becomes, "which social context(s) should students focus on?" For example, which reader should students keep in mind while writing, the grader or the hypothetical professional audience? My data indicated that attending to the grader was sufficient for adequate classroom performance. Even though some of the students could imagine a professional audience and purpose for their lab reports, all students, of course, also focused on the rhetorical situation of the classroom. When asked to identify an audience for their reports, 16 of 19 respondents named the TA, other students, or no audience at all. Only three students mentioned the hypothetical professional audience.

Nevertheless, the same students who focused on the audience and purpose of the classroom might have been much less aware of the ideological effects of the classroom context. During the interviews, none of the students referred to ideological concerns such as valuing individual performance, endorsing competitive ranking, or deferring to the authority of the instructor and the institution. As Dias et al. point out, it would have been extraordinary for these "oldtimers" in the classroom context to attend to ideology because "the values and choices involved in particular discourse formulations disappear through habit or familiarity" (233).

Yet students did articulate, albeit haltingly and imperfectly, the beliefs and values of the professional context. This suggests that while working in a classroom context, it may be easier for students to grasp professional values and beliefs (ideology) than to imagine professional readers they have not encountered or professional purposes that they have not tried. Professional ideology may be accessible from the classroom through discussion and explicit teaching, even though participation in the professional social

context is not. Given Dias et al.'s observation that once they enter the workplace, "Interns and newcomers...internalize that culture's way of doing things, norms as well as knowledge" (231), the upper-level writing-in-the-major classroom may be the best place for students to gain an explicit awareness of ideology embedded in disciplinary genres. Despite this potential opportunity, my assessment of student genre awareness indicated that study participants did not have much awareness of ideological effects of genre conventions. Further research is needed in order to clarify my findings and to explore the possibility that awareness of workplace ideology can be gained in the classroom.

Conclusion

My definition of indicators of genre awareness and the subsequent ranking of students was a complex, imprecise, and inevitably subjective undertaking. Given the rich evidence in Chapters Three and Four of the variability of student experiences with writing and the complexity of literacy teaching and learning, the difficulty of assessing genre awareness is not surprising. Another researcher attempting to follow my methodology might not obtain exactly the same results. However, I believe it is likely that four findings were strong enough that they would be repeated: (1) students overall would show low genre awareness, (2) students would demonstrate greater awareness of the rhetorical purposes of lab report conventions than of their ideological effects, (3) students with strong disciplinary identification would show higher genre awareness than those without it, and (4) some insecure writers would be found to demonstrate higher genre awareness than some more fluent and confident writers.

The student with the highest genre awareness according to my empirical definition, Liz, was a very articulate student who was dedicated to the study and care of

horses and who had the ambitious career goal of being an equine veterinarian and researcher. We had a lively interview, and she seemed to enjoy thinking about the questions I was asking her. When she could not immediately answer a question, she would often speculate about it and generate ideas as we talked. Liz recognized that her future work would include writing research reports that would be similar to the lab reports she was working on in Animal Behavior. All of these factors - her personal characteristics, career goals, and the congeniality of our interview - very liked contributed to my assessment of her genre awareness.

Comparing Liz's interview with that of the two students with the lowest genre awareness can shed light on both my assessment of their genre awareness and on my assessment method in general. Nina and Sophia would be considered to have the least genre awareness of all the interviewees according to my empirical definition. They both had rankings of "no awareness" for both awareness of ideological effects and awareness of rhetorical purposes. Both of these students seemed to me to be very self-directed about their education even though neither had clear career goals. Sophia was closer to graduation, and her immediate plans were to work in her father's business, which was unrelated to her studies in Animal Behavior. At 19, Nina was one of the youngest students I interviewed even though she had reached junior status. Nina, whose strongest interests focused on art and creative writing, was planning to complete her degree in three years rather than four in order to "get a degree and then go and have some fun." Sophia and Nina contrasted in their approach to education: Sophia was trying to squeeze in as many courses as possible, while Nina's goal was simply to meet graduation requirements while including as many "fun" courses as possible.

My interview with Sophia was comparable to my interview with Liz in terms of her apparent comfortableness in responding to questions and sharing her ideas. Nina, however, was less talkative and did not volunteer as many ideas of her own. Compared to Sophia and Liz, Nina seemed much less interested in the questions I was asking. If only Nina had been ranked as having the lowest awareness, I might have concluded that her ranking could possibly be explained by the nature of the interview. However, Sophia's richer interview resulted in the same ranking. Therefore, I have more confidence that the low ranking for Nina and Sophia could be related to their lack of disciplinary identification rather than to bias in the assessment method.

The complexity of writing and the subtle quality of genre awareness make it difficult to assess genre awareness and to draw firm conclusions about factors that contribute to its development. More research and studies involving more participants would be needed to obtain more reliable assessments and to discern consistent patterns of association with contributing factors. This study has suggested possible directions for such projects.

CHAPTER VI

STUDENT EXPERIENCES REVEAL REASONS FOR NEW PEDAGOGIES

As outlined in Chapter One, advocates of pedagogies that promote genre awareness argue that it will help writers negotiate new writing situations. A basic assumption shared by all four pedagogies is that genre awareness enables students to explicitly recognize the situated nature of writing and to take a critical, analytical approach to understanding how genre and social context interact. In addition, those who have proposed these approaches claim that genre awareness is knowledge about writing that students can apply to any new writing situation.

In this chapter, I consider my third research question[1] by discussing four benefits that advocates of explicit teaching of genre awareness predict their new pedagogies will offer. These predicted benefits are transfer of learning, rhetorical flexibility, freedom to make discursive choices within the constraints of a genre, and preparation to resist or knowingly accept the ideology embedded in a genre. The student comments I present in this chapter put a human face on issues the new pedagogies are intended to address. I use student experiences and perspectives to illuminate the complexity of learning to perform a genre.

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[1] Research Question 3: How might the experiences of study participants illuminate claims that genre awareness will benefit writers learning to perform a new genre?

Beaufort and Downs and Wardle: Adapting Knowledge to New Situations

The pedagogies suggested by Beaufort and by Downs and Wardle were motivated in part by their desire to foster transfer of learning. They suggested that genre awareness would prepare students to adapt knowledge gained in one writing context to new writing opportunities in the future. Although I did not set out to investigate the issue of transfer, students touched on it when I asked them to compare previous writing experiences to writing the advanced lab report. Five students connected what they had learned elsewhere with writing advanced lab reports. In contrast, three others perceived a wide gap between writing lab reports and their previous writing experiences.

Three students indicated that they did not see previous experiences as being helpful. Sondra seemed to believe that she could have learned once and for all in freshman year what she needed to know about writing, lamenting, "Why didn't they just teach us that in the beginning? I don't understand why they didn't just teach us this freshman year!" Ava implied that the work she had done in writing classes was wasted, saying "You learn how to write in elementary school, middle school, high school. And then you get to engineering and it's like 'Nope, you're writing wrong. You need to write this way.' It's like, Great! Awesome! [laughs]." Likewise, Nina found little in common between writing lab reports and her previous extensive experience with creative writing. In her view, "They don't seem connected at all. I think the only thing that is the same is that you are using sentences."

The actual practice of these three students who denied drawing on previous experiences may not have been fully represented in their brief –and in every case intentionally humorous—statements about the usefulness of their past writing courses.

However, most students (19 out of 24) did not mention ways that previous writing experiences could be applied to learning to write the advanced lab report.

However, five students talked about drawing on what they had learned elsewhere when writing advanced lab reports. Nishan explained that his experience writing emails as a leader of a student organization prepared him to grasp the rationale for using precise language in lab reports and other professional communication.

> *Nishan, a CiE student*
> Nishan: ...You have to make sure you get your point across correctly...[For example,] there are a lot of times where emails are mistaken when they are read, so you really got to get your point across so there is only one way to read it and not another way. And that is really hard... I am the captain of the team here and...if you are sending something out to the team, it is read four different ways. ...it is really hard to get one thing across in one way to everybody.

Robyn, Taylor, and Liz reported applying what they had learned about writing in English classes to writing lab reports.

> *Robyn, an AB student*
> Robyn: ...by taking my English courses in high school... I developed a sense of structure and organization for papers and kind of writing with the reader in mind. And then you can translate those skills to science.

> *Taylor, an AP student*
> Taylor: I think that my background in writing for the humanities actually makes my lab reports better, even though scientific lab reports are obviously a little more cut and dried. But I am used to having to articulate my ideas about things... I think there is a huge cross-over as long as you are reading enough of the literature to know what to leave out of a lab report. There is a certain spectrum of how much creativity you should put into a professional looking lab report.

> *Liz, an AB student*
> Liz: This is a paper that I do for my lab which is Animal Behavior. That is how I think of it. Cause this I find that I got more from my English classes writing this. How do I explain this? I pulled a lot more from English than I did from science.

Cynthia also was aware of drawing on "old papers" that she had written when working on the discussion section of her lab reports, the section that many students agreed was the most difficult to write. Cynthia was a sophomore who, like Taylor and Liz, said that she had "always loved writing."

Cynthia, an AB student

Cynthia: The discussion was harder for me because it wasn't on facts. Because the rest of the paper was so based on facts, I got into that. And then I have to go into the discussion which was completely different from the rest of the paper... because it was going back before all of the learning how to do the rest of the scientific paper now, going back to the old papers that I had done. It was hard to mix both styles.

Joleen: Oh now I understand better... To write the discussion you are drawing on other kinds of writing. It is like where the two come together.

Cynthia: Yeah. So it is kind of very different from both because you have to put the two together.

Like Liz, Cynthia had difficulty articulating exactly what the connection was between the two kinds of papers. I surmise that she sensed that the discussion section was an argument, similar to "old papers" (perhaps thesis-based essays in English class), and that its persuasive nature set it apart from the referential discourse of the other sections of the lab report. Notice that she realized that the discussion section was something new - not exactly like the "old papers," yet different from the "based on facts" style she was working to master in the other sections of the lab report.

Johns: Flexibility in the Writing Process

Johns contended that the students need to develop genre awareness and rhetorical flexibility. My study provided the opportunity to examine whether students could adapt their writing practices to meet the demands of a new rhetorical situation. For most study participants, writing the advanced lab report demanded a different writing process than the one they had used for previous, rudimentary lab reports in introductory science

courses. However, survey and interview data showed that relatively few students were changing their writing process. Barbara's interview, in particular, provided a complex picture of the factors that might limit flexibility in the writing process.

Among those who were changing their writing processes, Heather and Frank exemplified those who talked about the way different disciplines or even different genres required them to use different writing strategies. Heather explained how she approached writing differently in Philosophy compared to Animal Behavior.

> *Heather, an AP student*
> Heather: [For] a philosophy paper I can be sitting someplace without the computer in front of me ...and be thinking about it and composing it in my head without anything with me. Whereas this kind of thing [lab report], I feel like I need to be sitting down in front of the computer. I need to be have the facts and the figures here and the other information here and then I will sit down and write it... I can't... prepare for it if I am just sitting down on the couch watching TV.
> Joleen: Or you are waiting in line somewhere
> Heather: Yeah Exactly, exactly. I need to be where the information is which makes it a little more difficult... Whereas if I am doing a philosophy paper, I already have something in my mind as to where I am going to start, if that makes sense... Even if I don't realize I have been thinking about it. It comes out usually when I sit down to actually write about it. ... I suppose that might be something that would come as I did more of it. Like I said this is one of the first classes where I have had to do the full report.

Heather noted that she used information differently in the two kinds of assignments, and also that her limited practice with the advanced lab report might be affecting her writing process.

Frank's account of his writing process showed how previous experience with simpler lab reports could not be applied directly to the advanced lab report. In fact, his success with the simpler lab reports seemed to make it more difficult for him to change

his writing practice, a theme I noted in several other interviews. Early in the interview, Frank described how he learned to write with what he called a "minimalist approach."

> *Frank, an AP student*
> Frank: I figured out that in organic chemistry I could write two-page lab reports and get an A, rather than four-page things where I am trying to put more into it than there needs to be... I was just putting so much effort in to it and not even getting as good grades as when I stopped over-thinking it and just wrote the basics.

However, later in the interview Frank noted that this approach was "not working" in Animal Physiology. He did not immediately recognize that the advanced lab report had a different purpose – was essentially a different genre – than the introductory one.

> *Frank, an AP student*
> Frank: I write really minimalistically and [I] think one of the TAs in particular gets mad at that ...I can say all the requirements in one paragraph, but they would like it to be two paragraphs.... I've learned so much to be really minimalistic with lab reports but now it is not working that way in class.

As Frank went on to discuss the purposes of the two lab report genres, he eventually concluded that the advanced one combined aspects of both the "busy work" organic chemistry lab report and the more analytical literature review. This recognition helped him see why he needed to change his approach to writing the advanced lab report.

> *Frank, an AP student*
> Frank: There are those [lab reports where] you just say what you did in the lab and that is real basic and minimalistic. And then there is the literature review... but a real scientific paper is both, which is what we are doing in Animal Phys where you need the introduction with literature review and then what you did, the results, and then discuss how it measures in with the primary literature. [pause] So yeah. It is kind of interesting, cause... I feel it [the advanced lab report] is kind of in the middle... So it is kind of interesting because they are two very different things. One is busy work learning a skill, and the other one is learning information...

In contrast, Barbara did not demonstrate the same flexibility in the writing process as Frank did. She persisted in writing practices that had been successful for her in the past, despite encountering problems using them to write the advanced lab report. For example, Barbara described herself as an effective research writer, and as a result she felt confident about writing the introduction section of the advanced lab report. In her words, "I am really good at writing research papers ...I can use a data base like it is nobody's business!" Later in the interview she explained, "I think I had an easy time writing the introductions because introductions are just like a brief research paper."

In her enthusiasm for doing literature review, Barbara devoted excessive time and effort to writing the introduction section. When narrating her writing process, she explained, "The introduction is the longest part, and that can take me anywhere from 1 hour to 3 hours." However, her evaluation of the importance of the introduction section was not accurate, and the attention she devoted to it was misplaced. On her first lab report, the grader gave her extra credit for her literature review, but she still earned only a C overall. Barbara seems not to have grasped that the primary purpose of the advanced lab report was to interpret data, not to display learning. In the advanced lab report, the discussion section, not the introduction, was the most important part.[2]

Other students, including Taylor and Nancy, began writing the lab report not at the beginning with the introduction section, but with either the materials and methods section or the results section. They then wrote the discussion section, and completed the introduction at the very end when they might be tiring and the deadline for the lab report was approaching. As Taylor explained, "I tend to do the intro last because it is a lot of

[2] This difference in importance was reflected in the grading rubric, with the introduction being worth three points and the discussion worth nine points in Animal Behavior. A similar point difference was reflected in the other two courses as well

background stuff, and as much background as I want to put in there I can. But if I run out of time, then I can just leave it." Nancy reported following a similar strategy for the same reason. They had adapted their writing process to fit the demands of the advanced lab report.

The writing sequence followed by Taylor and Nancy is recommended in science writing handbooks and identified by Rymer as the approach typically followed by professional scientists (223). In both Zoology courses, the instructors also urged students to follow this sequence.[3] However, most students were not used to this practice. As Frank had explained, in previous courses acceptable lab reports could be written from beginning to end because the discussion section in these reports was less complex and demanding.

A pattern I noticed during the interviews was that students who were perplexed about the purpose and content of the discussion section of their reports also preferred to write the lab report straight through from beginning to end. Like Barbara, they may have found the introduction section to be more familiar, and so an easier place to get started. Pam, Ginny, Sherry, Nina, and Kelly all said that they felt most confident about writing the introduction section of their reports, and would usually begin writing with that section. Barbara acknowledged that her method of writing the report straight through from beginning to end "confuses people, I know." Yet even when her writing process caused problems, she was not willing to change it.

> *Barbara, an AB student*
> Barbara: There have been times when I am writing the results, and I look at my figures and the results and I am like "Wait. wait." ...For one of

[3] The writing sequence was irrelevant for Civil Engineering reports since the different sections were written simultaneously by a team of students.

> my last classes ...I was looking at our chi squared value and...I was like "I don't think this actually supports our hypothesis." I was like "Wait is this supposed to support our hypothesis? I don't know what is going on!" I asked my friend, and she is like "I think it supports our hypothesis," and I am like "I don't think this does." And so I decided I was just going to finish it up the way it was, and if it was wrong, who cares?

If Barbara had followed the recommended practice of writing her introduction after she had analyzed and interpreted her data, she would have avoided this problem. Instead, she did not discover the discrepancy until after she had written the introduction, and so she decided not to go back and revise it.

John expressed how difficult it was for him to change his writing process to match the priorities of the advanced lab report.

> *John, a CiE student*
> John: I have gotten better at writing the introduction afterwards rather than first. Which is really, really hard to do, to jump to the middle of the paper and start writing that and then come back and write the beginning of it at the end... it is so intuitive to start at the beginning. Like how am I going to introduce my topic to my readers? How am I going to make them want to read on?... But that is not the way you should do it... You need to write what you need to write and then figure out a way to hook 'em after.

John's account suggests that "jumping to the middle" may have been difficult because it violated years of writing instruction that had taught him to focus on creating a strong beginning and "hooking" the reader. The two surveys I conducted showed that, despite the lab instructors' encouragement and the demands of the advanced lab report, many students did not make the change that John did. Aware of the recommendation to begin writing the reports with the results section and composing the introduction and abstract afterwards, I asked students at the beginning and the end of the semester which section they would begin with when writing a lab report.

Responses to Survey 1 showed that at the beginning of the semester more than three quarters of the Zoology students (78%) and even more of the Civil Engineering students (82%) reported that they would write the report from the beginning to end. A little less than half of the Zoology students[4] changed to what John called "jumping to the middle" by the end of the semester. In other words, more than half of the students who wrote reports from beginning to end at the beginning of the semester (24 out of a maximum of 45, or 53%) did not change and still did so at the end of the semester.

Table 6.1

Lab Report Writing Sequence Among Zoology Students

	Survey 1	Survey 2
Number who started with the abstract or introduction	45 (78% of respondents)	24 (44% of respondents)
Number who started with materials and methods or results	13 (22% of respondents)	31 (56% of respondents)
Total number of respondents	58	55

Overall, data from my study offered limited evidence of flexibility in the writing process among study participants. The interviews included several anecdotes of students describing how they were adapting their writing process to meet the demands of the advanced lab report. Of equal interest were students who seemed to resist changing the practice of writing the lab report straight through from beginning to end. This apparent lack of flexibility may have been due in part to students not realizing that the advanced lab report had a different purpose from the lab reports they had written in previous,

[4] I did not give Civil Engineering students a question about writing sequence on Survey 2 because I did not expect their opinion to change as a result of the writing they did during the semester. This is because advanced lab reports in Civil Engineering were written by teams of students who divided up the sections. No one student ever had the opportunity to write it from beginning to end.

introductory science classes. In addition, students like Barbara who had developed a successful strategy for writing introductory reports seemed more reluctant to try changing that strategy than did less confident writers such as Heather.

Devitt: Writing as Choosing versus Writing as Guessing

Advocates of explicit teaching of genre awareness envision the student writer as making thoughtful and deliberate discursive choices. Devitt et al contend in their textbook for first year writing courses that when faced with new writing situations, students should be able to "turn to [their] knowledge of genres...[and] make choices about major rhetorical elements" (95). They believe that for students who possess genre awareness, "writing becomes choosing, not guessing" (95). In the academic context this would mean that students would enter a new course prepared to investigate a genre and its social context by asking questions about the instructor's expectations, analyzing the assignment and model texts, and interrogating how the assigned genre might be used by experts. They would be making rhetorical choices, rather than merely trying to guess "what the teacher wants."

Such a conception of the student is consistent with a Freireian approach to education that values freedom over conformity. In Freireian terms, such students are "responsible subjects" who "know and act" rather than "objects" that are "known and acted upon" (36). However, in some courses – particularly those in science and engineering that cover large amounts of course content— students' individual goals for writing and learning can be overlooked, and a banking model of education can prevail, with students functioning as knowledge containers to be filled by teachers (Freire 72). In the upper level lab courses I observed, students were given some measure of autonomy in

designing or conducting the experiments, but the TAs determined the standards for acceptable discourse practices, echoing Freire's description of banking education in which "The teacher knows everything and the students know nothing" (Freire 73).

In my study, students depended on the lab instructors to define expectations for writing the advanced lab report. In the classroom setting where students are writing for a grade, some measure of dependence on the instructor is inevitable. Yet Thaiss and Zawacki's discussion of the "productive tension" between the student and the conventions of a discipline argues against setting up a binary between freedom and conformity. They contend that a teacher "must attend to both exigencies" and support student passion for learning while simultaneously teaching the conventions of the academy (141).

I observed a range of student responses to the relatively conformist environments of the three courses I studied. On the one hand, some turned to the professional social context of the advanced lab report and compared the grader's preferences with those of other experts or to their own experiences in the workplace. In this way, they achieved a critical perspective on the conformist pressure of the classroom. For them, writing might be somewhat like the "choosing" that Devitt et al. envisioned as a benefit of genre awareness.

In contrast, other students focused more on the social context of the classroom and accepted the TAs' preferences. They often seemed to be following a trial and error method of learning how to produce acceptable lab reports. In John's words, "We have to learn by failing with a chance to do it over again." Rather than "choosing," for them

writing seemed to be more "guessing" what the TA wanted to see. This was certainly the case for Sophia.

Compared with other students I interviewed, Sophia had an extremely keen but narrow awareness of rhetorical purposes of the classroom context. For her, the grader determined what was valued, and her purpose as a writer was to satisfy the grader. Her pragmatic attitude toward her writing assignments clashes with the way Devitt et al. position the student writer.

Sophia seemed to have resolved the "productive tension" that Thaiss and Zawacki theorize exists "between the student—a passionate individual with interests to cultivate and express—and an academy that imposes expectations on individuals" (141) by attaching her interests to satisfying the academy's expectations. Her interview was peppered with references to "what 'they' want" or "what 'they' say" to do. For example, even when her reading experience helped her to recognize the rhetorical purpose in creating detailed figure legends in her lab reports, she explained her understanding in terms of "what 'they' want."

> *Sophia, an AB student*
> Sophia: And with the legends you read enough of them and you know the type of information they are looking for in them. They want someone who sees the graph to be able to understand what it is without having to read the text.

As the following statement illustrates, she seemed to be centered on finding out what the grader wanted to see, not on developing her own understanding of the lab report. The excerpt also shows a type of exchange repeated throughout the interview in which I asked a question intended to elicit her understanding of a genre convention, and then I was surprised by an answer framed in terms of what the grader wanted. In this case, we

were reviewing her first lab report of the semester when I asked, "The discussion is separate from the results. Does that make sense to you?" I was looking for a rhetorical reason, perhaps a reference to how scientists tend to skim reports to find the results quickly. An ideological reason[5] was possible, too, though not expected. However, the answer I heard instead focused on what "they wanted."

> *Sophia, an AB student*
> Sophia: Yeah I tried [pause] on my first draft, I had a discussion and then a conclusion which I thought was the way you did it. But the conclusion is in the discussion. I thought it was its own section, but it's not...I feel like in other classes that I had a conclusion separate. That was what they wanted. That is why you do rough drafts, so they can tell you that is not what they want!

Sophia's desire to find out about the grader's expectations in itself was not unusual or necessarily evidence of low genre awareness. Thaiss and Zawacki observed that even confident, stage three writers "stressed the need for feedback on the first assigned paper" (124). What perplexed me about Sophia was the way she continually avoided expressing her own understanding of genre conventions when I asked her directly to do so. The next excerpt, also taken from the part of the interview when we were examining her graded lab report, shows a similar dynamic, and it demonstrates how her emphasis on grades seemed to limit what she learned from her instructor's feedback.

The excerpt begins with me asking her to point out a strength of her lab report, but instead she focused right away on how she lost points. When I asked her directly about a positive comment, she demonstrated no desire to understand why it was positive, saying "I don't know" after making a quite reasonable guess about what she did well. Her attention was so riveted on the places where she "lost points," that she seemed

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[5] Paul had made such a comment, explaining that because the results represent objective truth, their value remains unchanged and they should be separated from the writer's interpretation of them (the discussion) which may be superseded by new ideas in the future.

unwilling to think about the places marked by the grader as "good." She wanted to know what to change to avoid losing points, but expressed no interest in understanding why she needed to make the changes.

Sophia, an AB student

Joleen: I would like you to talk about this particular report that we have got in front of us. First, is there anything you want to show me that is really strong? I see that there is a "good" marked by your data table.

Sophia: I haven't really read over it again since I got it back. I lost silly points on like for some reason I didn't put error bars on this one. [She is not looking at the data table I referred to but at a nearby figure.] I thought I only needed them on the first one. Which I should have known I needed them on all my graphs.

Joleen: Cause you have it on the one.

Sophia: I lost points there. I don't know.

Joleen: It says "good" here under your materials and methods. Do you know what he liked about it?

Sophia: I don't know. Maybe because I clarified it a little bit. Yeah. I don't know what he liked about it. I don't know. He didn't really write too much on this one. ... He writes a lot of comments on the first draft.

Joleen: And that was helpful to you

Sophia: Yeah. I changed everything he said. And that is basically all I did. Like, I didn't add too much more. What he said needed to be changed, I changed. And that is all I did. And I think it's very nice of them to let us write a first draft, and then they fix it... I feel like it is a lot of work, but they do it, so I'll take advantage of it I guess.

Sophia didn't see the TA's comments as guiding her to express her own ideas more clearly or expertly. Instead, she perceived them as "fixing" what she had written. In her view, detailed teacher feedback was a boon because she did not have to guess what the TA wanted if he was willing to tell her.

An honors student with a double major who took a maximum course load every semester, Sophia was an expert in earning the highest grades in the most efficient way possible. She subscribed to the belief that she wrote better "under pressure." In her experience, spending too much time on an assignment might not produce the result she was most concerned about: a higher grade.

Sophia, an AB student

Sophia: I always feel that I write better under pressure because I have before. Like I'll write a paper really fast and get a B+ on it. But then I'll take my time and go back and look at it a few times, and I feel like if I give myself too much time on it I change things too much, and then I don't do any better or maybe I do worse. That happened to me once.

Joleen: Really?

Sophia: Yeah. I spent too much time on it, and I thought that it was a really good paper, and my teacher didn't even like it... I don't know if maybe it was the topic or what it was, but that was the last time that I spent a lot of time on an English paper!

Despite her lack of explicit understanding about why some papers received higher grades than others, Sophia was confident about her writing. She relied on her fluency to keep up with her heavy course load, and implied that writing more than one draft might not be worth her time.

Sophia, an AB student

Sophia: One thing I wish they would do is I wish they would give you a grade on your rough draft like "If you would pass this in, this is what you would get." But I guess they want to make sure that they do your best and pass in a second draft... From a student's point of view - like where you have a lot of other stuff to do - why would you do a second draft if you got an A on your rough draft?... But they won't do that. I already asked.

Sophia's zeal to produce what the grader wanted to see led her to quickly abandon her own preferences and perceptions about what made a lab report "professional." For her, what the grader preferred was the best way. When the grader was pleased with her work, it had "turned out better." She accepted the TA's pronouncement without hesitation, whether or not it contradicted her own understanding or previous graders' requirements.

Sophia, an AB student

Sophia: I try not to do it [use first person pronouns] in English, too, but... my teachers in response papers they want you to ... The first few I didn't want to put myself into it because I feel that that weakens the argument almost. Like I just wanted to keep myself out of it. But then I got to the point where "This is what I think" and I guess they turned out better. I just don't like the way it feels when I read it. I can't really

> explain it.... for my thesis I will not put myself in it at all....unless I am told to. Then I will change it.

In the following excerpt, Sophia seemed fairly certain that the TA's requirement was not consistent with published papers, i.e. "a real science paper." However, she wasted no effort in disputing or complaining about what the TA wanted.

> *Sophia, an AB student*
> Sophia: I had my graphs throughout my paper. Like some of my graphs were in my discussion even though they are part of the results. Because like the results are so short it is like I have it here [in the final draft] where it is just graph, graph
> Joleen: Because the text is so short
> Sophia: Instead of text in between it like there would be in a real science paper
> Joleen: Oh
> Sophia: So I had put them throughout the paper, and he told me they had to go in the results section.
> Joleen: And your reason was that just made it look like what you had seen more in
> Sophia: Right. It looked I thought more professional because. Maybe I am wrong but I thought in science papers that you would have them all over in the paper. So sometimes the results you'd find it in the same page as the discussion. You know what I mean?
> Joleen: Yeah.
> Sophia: So I thought it was OK, but I was told it wasn't.

Sophia demonstrated little attachment to her own understanding of lab report conventions, which set her apart from the other students I interviewed. Even those with less confidence and lower grades made reasoned arguments about why they resisted some of the TA's preferences. Sherry and Ginny illustrated two more typical responses to critical feedback from the TA.

Sherry recognized the tension between a writer's individual goals and "what the teacher wants," and sought to forge her own path between them in a way similar to the third stage writers described by Thaiss and Zawacki. In the following excerpt, she

explained that she sought to satisfy the requirements of the assignment, but to do it in her own way, with her individual "voice."

Sherry, an AB student
Sherry: You got to figure out in your writing: what your teacher wants you to say and what you need to say, and finding the line between what you want to say and the teacher wants. The assignment is what the teacher wants to say, and then finding what you need to say and making it work
Joleen: [clarifying] What you want to say, what the assignment says... What you need to say is a mixture of those?
Sherry: I say what I need to say, but I say it with my voice, not my teacher's.

Later in the interview, Sherry provided an example of how she negotiated the TA's instructions in order to organize the introduction of her lab report in a way that made sense to her. She was aware that the TA wanted her put the description of the animal model used in the experiment at the end of the introduction. But Sherry felt that doing so would disrupt the logical flow of what she wanted to say.

Sherry, an AB student
Sherry: They like it when you put the animal last. That is what our lab report person [the TA] wants us to do. But I can't really talk about our predictions or our hypothesis properly without first putting in the animal. So I tend to discuss the animal and then do the hypothesis and predictions. Or, I might put in our hypothesis, talk about the animal, and then do the predictions.

While Sophia quickly let go of her own ideas about writing the report if they differed from "what the teacher wanted," Sherry selectively integrated the teacher's preferences into her writing decisions. Sherry maintained ownership of her writing instead of assigning ultimate authority for it to her teachers as Sophia did. Sophia showed little interest in understanding the reasons behind the rhetorical choices and writing conventions that her teachers preferred.

Demonstrating a third kind of response to teacher feedback, Ginny questioned the teacher's preferences even as she submitted to them. In the following conversation, Ginny disagreed with the TA's judgment about how much detail should be included in the lab report methods section. She imagined appealing her case to a journal editor as a more authoritative expert who might take her side on this issue.

Ginny, an AB and AP student

Ginny: It's more like when we write, it should be done this way. But at the same time you can't really tell the people. Like they say 'write it like someone else could understand you.' But you have to leave out the really good details like with uhm the really little details like swirling water. But maybe the people wouldn't know to do that, ...I think it should be in it, but we are not supposed to put it in the lab reports

Joleen: So... What you should have in it, What you are supposed to do – That is coming pretty much from the instructors?

Ginny: Yeah. The instructors tell us what to do. They even tell us to swirl it a little. I wish we could put it in the [pause] If I was making my own to publish, I would probably try to do that and see what the publisher said [laughs].

Whether or not Ginny was right about the amount of detail that was appropriate in the advanced lab report, the fact that she resisted the TA's preferences showed that she was thinking critically about her writing decisions and was working from her own growing awareness of the genre's professional ideology and rhetorical purposes. Unlike Sophia, Ginny was attempting to develop her own consistent conceptual framework for writing lab reports.

Perhaps the reason for Sophia's different response was that she did not consider her lab report to be a "real science paper." She appeared to think of it primarily as a transaction between her and the grader. Her focus was on the classroom context, which was not surprising given that she was not planning to pursue work or further education as a scientist after graduation.

Sophia's story shows that students with strong rhetorical skills and a focus on the classroom context can do well on college writing assignments and learn classroom genres without developing explicit awareness of the professional beliefs and values embedded in them. However, Sophia's focus on the classroom context for the advanced lab report assignment may put her at a disadvantage when attempting to learn genres in the workplace, which Dias et al. argue requires a very different way of learning. They cite a body of research showing that, as newcomers to the workplace, students who have successfully learned to perform a variety of genres in an academic setting "commonly report feelings of disjuncture and anxiety quite different from those experienced in their schooling" (197). Dias et al.'s crucial insight is that the unexpected difficulty these students experience is not due to simply having to learn new genres, "but rather to the need to learn new ways to learn such genres" (197). My data suggest that genre awareness that includes ideological as well as rhetorical components, as theorized by Devitt, has the potential to address this need to "learn how to learn" identified by Dias et al.

Sophia's reliance on the TA to determine both what to write and why might leave her unprepared to learn a genre in a situation that is "dynamic, in flux, and very much located in institutional histories, personal relationships, and local, temporal events" (Dias et al. 232). If instead she had taken an active role in analyzing how the ideology and purpose of the professional context shape the advanced lab report, she would have gained not only a rudimentary grasp of the workplace purposes and ideology, but also a sense of the initiative she would need to learn genres in the workplace.

Study participants who looked beyond the classroom to the professional context to explain genre conventions often had gained workplace experience through internships, independent study, or part-time jobs. Sean, who had carried out the work of a professional engineer during his summer job, illustrated the sophisticated perspective on learning that such experience can bring. During the interview, he compared learning on the job to learning in the classroom, valuing both.

> *Sean, a CiE student*
> Sean: [on the job] I would ask about 5,000 questions a day. You have to learn it
> Joleen: Is that kind of learning better than classroom learning?
> Sean: I won't say better; I'll say different. Classroom learning ..I would say like ...the class my friend has for hazardous waste. [In] That class you will [learn] that, but you will also learn a bunch of different things. At a job you kinda learn just what you need to do your job... so you learn that but you don't learn much more.. you kinda just stay at the same level...But working, you learn faster cause in class you can just space out and not pay attention. Maybe you read the book a week and a half later. But working you have to learn it or else you can't work... I tend to learn faster being hands on like in a work situation. [But] I do enjoy class because you do get a wider knowledge... in classes you get the bigger picture more than just "we need this done for this job."

However, students who had not yet had disciplinary work experiences, such as Nishan, Rob, and Sherry, also showed genre awareness that demonstrated an understanding of workplace practices and exigencies. I speculate that the source of their genre awareness might have been experiences outside the classroom that helped them to imagine the function of the lab report genre in its professional context. Though they had not yet worked in their disciplines, Nishan and Sherry both had developed expertise and been leaders in activities related to their disciplinary interests. Rob had heard about the workplace from his father and brother who were both practicing civil engineers.

Yet, I found that even students whose primary link to their discipline was the classroom still could envision the workplace setting and imagine how the purposes and ideology of that context might explain the discourse conventions they were learning in the classroom. For example, Ginny recognized the similarity between getting feedback on a rough draft and the document cycling that occurs in the "real world."

> *Ginny, an AB and AP student*
> Ginny: In Animal Behavior I do like the fact that they do let us turn in a rough draft first so that they can give us feedback Even if it is not like fully detailed feedback like at least we get some idea and we can go over it again And figure, 'Oh this doesn't even sound right.' So we can realize what we do and turn it in again. Cause I mean like even in like the real world they are not going to be grading us they are gonna just give it back to us and tell us we need to fix it.

Granted, Sophia also saw the rough draft as an opportunity to find out what the TAs wanted her to "fix." The difference I see between the two students is that Ginny seemed to expect the TA's feedback to enhance her own conception of the genre, and Sophia did not seem to look for this kind of learning. Ginny said she would use the feedback to "go over" her report again, recognize what "doesn't sound right," and "realize what we do and turn it in again." In contrast, Sophia said she simply changed "what he said needed to be changed... and that is all I did." The most likely explanation for this difference is that Ginny expected to use this genre in her future career, and Sophia did not.

My study suggests a qualification to Devitt's contention that genre awareness will enable students to make choices within the constraints of a genre rather than to guess about how to proceed with their writing. Sophia's experience contradicts the assumption that all students would seek such a goal. She showed that without disciplinary identification, students may not be motivated to think about the shaping influences of the

professional social context on a writer's choices. Or, students focused primarily on the classroom context may not gain the critical distance necessary to see that choices are possible, particularly in highly conventionalized academic genres such as the lab report. On the other hand, those who envisioned the professional context for the advanced lab report, even if they had to imagine it, seemed more likely to be aware of the existence and nature of the rhetorical choices it might afford. My study suggests that students may need to have a desire to participate in the relevant professional context and its genres in order to make their own choices rather than to rely on the instructor to define what to write and why.

Devitt: Recognizing Embedded Beliefs and Values

A second argument that Devitt makes in support of genre awareness is that it will prepare students to either resist or knowingly accept the beliefs and values embedded in a genre (195). I explored interview transcripts for evidence relevant to this claim and found that some students were aware of the power dynamics represented in genre conventions. I also observed that uncritical acceptance of the ideology embedded in the lab report seemed to foster a parochial view of epistemology.

Social Power and Genre Conventions

A few students in my study touched on the relationship between social power and discourse conventions. For example, Heather saw how the scientific discourse community could function as a closed, exclusive group.

> *Heather, an AP student*
> Heather: If you read a philosophy article you don't necessarily have to be a philosopher to read it and understand it. ...Whereas in your technical, scientific writing, they are writing for other scientists and other people in their field. So I kinda get the feeling that they forget that other people might want to try to understand them, too.

Frank observed that powerful members of a discourse community could get away with violating discourse conventions such as avoiding first person pronoun use.

Frank, an AP student

Frank: I am pretty sure I have read papers where they use the first person. I am pretty sure I have noticed that it is usually prestigious scientists who can do it because they are the you know, the best and they are old and they can write "I did this."

Likewise, Sondra and Paul expressed the belief that as disciplinary novices, they were obliged to follow the conventions that had been determined by others. Sondra stated, "It is just the way it is. Like someone long ago invented how to write a scientific paper, and now the rest of us have to do it." Paul made a similar statement (quoted below), and explicitly mentioned the role of social power ("authority") in enforcing standards.

When asked why students must avoid using first person pronouns in lab reports, Paul suggested that the purpose might be to distinguish scientific writing from simpler kinds of writing, such as novels. He speculated that scientists might use language that is difficult to understand in order to show their intelligence and establish the authority or seriousness of their work.

Paul, an AP student

Paul: Maybe ...they want to look very, I don't know, very clever? Because scientists like most of them are PhDs ...If they write too simple, like everyone can understand, it might be [pause] It is about what authority... They want to... look more knowledgeable about this area. So if a scientific paper looks the same as a novel, nobody takes it too serious because it looks like a story. It is not a very serious hypothesis. It is not a serious experiment. They want something more - I don't know – authority. It looks more professional... I guess the first one who wrote the paper he was really knowledgeable, like Newton. He must know a lot of words. He is like a god. ..I guess he just wants to use those professional words. He knows all these words. He doesn't think those words are too hard to read or something like that and then. ..they have become a custom so all the followers think all the scientific papers should look that way instead of a novel.

When "all the followers think all the scientific papers should all look that way," then the result can be exclusion of those who cannot or choose not to conform. Anya's story illustrated one way that the conventions of scientific discourse can form a barrier to a student's career goals. She was one of only three sophomores in her Animal Behavior course, and relatively inexperienced with reading and writing research reports. A vegetarian from age nine, Anya loved animals and was highly motivated to pursue a career training whales and dolphins. She had persisted in following this dream despite the difficulties of a 40 minute commute to campus, having to re-take introductory chemistry, lack of a clear academic path to reach her career goal, lack of a supportive social network, and lack of well-informed professional guidance from family members, friends or academic advisors. As I listened to her describe her struggle to enter a discourse that she did not understand, I wondered whether she would be able to continue to overcome the barriers she faced. And I also speculated that there might be other students with similar science-related career goals but less drive who would not even get as far as she had.

Anya, an AB student

Anya: And honestly that is a big thing when it comes to [doing] scientific writing. You want someone to understand it. But at the same time when I read scientific journals, I don't understand it, so what the heck is the point? [laughs] So I don't know.

Joleen: That is a really good observation, actually. That a writer needs to have a particular audience in mind. But you are new to reading these.

Anya: Yeah. So even the people who write that stuff already have a mindset of who is going to read it. It is usually scientists, researchers, not me! I don't understand! So it is hard for me... to write in that sort of way cause I don't understand it.

Paul's comments about the challenge of writing in a second language shed additional light on the way that language conventions can present a barrier to those who seek to participate in a discipline. Near the end of the interview, Paul returned to his

earlier statement about the challenges he faced in using the required "godlike," "professional" words when writing a scientific paper, challenges not shared by his classmates.

Paul, an AP student

Paul: English is my second language. It is not like those native speakers. They can use English very fluently like whatever they want. But for me, people like me tend to use the first person ...But in these papers we are not allowed to use too many first person. ...We have to use third person... You have to use a passive... That is one challenge. The other challenge is that you have to use specific scientific words which we don't use very often in other readings or writings. Yeah, that is a headache for me. When you read scientific papers, you can see those long sentences with big words. It takes forever to understand those ...That is about reading; but for writing, I don't know. I try to be scientific. I am trying my best. I have a Chinese-English dictionary which I can type in the Chinese word cause then they will translate to English. So then I can see which word looks better, looks more academic or scientific or more professional. Then I will choose that word instead of a regular word, or those more oral words. We don't want to use too many oral words in a scientific paper... We want to avoid those words. Those are exactly the words we use most frequently in normal life ...But you cannot use them there.

Paul's task of writing lab reports in English was made doubly difficult by the fact that he couldn't use the vernacular variety of English that he practiced every day. Like Anya, Paul was an unusually motivated student. Even though he had only been in the U.S. for two years, he was earning "A"s and "B's" on his lab reports, higher grades than some of his native English-speaking classmates.

Paul's efforts were strengthened by a professor who seemed to understand the need to help students understand and analyze genre conventions. Paul credited this multilingual professor of a research methods seminar with helping him to understand the object of the lab report and showing him how to analyze published articles in order to guide his own writing.

Paul, an AP student

Joleen: Thinking about how you have learned to write this, you referred to this course you took last semester. You got valuable things from that course that you are using in this one

Paul: Yeah. That is the first writing intensive class I took, so that professor required I wrote a lot of full lab reports

Joleen: What kind of course?

Paul: It is from Professor Jones[6]. He is a Chinese guy, but he came to the US when he was a kid. His English is perfect. He writes very well. Perfect. So that is the first writing intensive class I took and then I learned a lot from him. Before that I knew how to read a report, but I didn't know how to write a lab report. He taught me what is object. What I should put in each part. Because that was a small class... only 8 people so the professor spent - yeah he is very nice prof - he spent a lot of time to read each sentence, to correct each word. Even the grammar mistake he will pick up your grammar mistake and write the right sentence beside. Once you work with that professor you will think "I have to work hard because he is working hard. He is putting a lot of effort on your report."... He suggested we read other people's articles on websites to see how they are writing. Professional writers or scientists. So Yeah I read a lot of those kind of things.

Professor Jones' personal familiarity with multilingualism and writing in a second language may have prepared him to help students negotiate the discourse barriers of his field. Certainly Paul received a double benefit from this professor, beginning with generous individual feedback on his writing. Secondly, Professor Jones gave Paul explicit guidance about the kind of discourse expected in advanced lab reports (e.g., avoid "regular" or "more oral" words), and he also taught him a how to extract guidance about language choices from published research papers.

Explicit attention to language practices strongly supports students who might otherwise be excluded by discourse barriers, yet it is not typical of lab courses I have observed. For every student like Paul or Anya who overcomes the barriers of disciplinary discourse, there may be others who remain excluded. Aware of the discourse conventions

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[6] Not his real name.

of his field himself and then passing them on explicitly to his students, Dr. Jones was contributing to shaping the genre and its social context. Dr. Jones' action was not radical—he was helping students conform to the current discourse conventions that assumed a monolingual discourse community. However, enabling multilingual students to participate in the discourse community will influence that community's discourse practices over time.

In this way, Dr. Jones was working for change in a way endorsed by Penrose and Katz. They write, "Scientists who are aware of the conventions governing their fields and the assumptions underlying them are better able to modify those conventions and work for change in their community's professional practices—to modify conventions that have become outmoded and no longer reflect or serve the interests and values of scientists, science, or society" (174). Paul's experience shows that despite the potential for genre conventions to be exclusionary, such barriers are not fixed and firm. Genre conventions are shaped by users of the genre, and they can be shaped intentionally when users are critically conscious of the genre's practices, ideological underpinnings, and rhetorical purposes.

Genre Awareness and Disciplinary Prejudice

A pattern of disciplinary prejudice surfaced across several interviews, particularly when we discussed first person pronoun use. The bias seemed to be rooted in uncritical acceptance of the objectivist epistemology embedded in the advanced lab report. Students with a strong preference for avoiding first person pronouns in scientific writing usually could not give a reason for their preference. In fact, those who made the least effort to speculate about why a writer should avoid first person pronouns seemed to display the

greatest repugnance at the idea of including them in their lab reports. I was surprised by the fervor shown by James ("If I was the professor ...I would penalize people pretty heavily for using 'I' or 'we'") and Barbara ("I don't think like that. Like 'I, we – No, No bad!'"). Their emotionally charged preference for an objective stance implied that these students might resist other ways of knowing. For example, a narrative approach to knowledge-making might appear to them to be less "professional" and not authoritative.

Students' comparisons between writing in English and in lab courses gave further evidence that some might be developing a narrow view of epistemology, valuing only scientific approaches to knowledge-making. Writing from personal experience or interpreting literature was often dismissed as "making stuff up." Liz pointed out that emotional overtones were out of place in scientific writing, with the exception of perhaps an angry rebuttal. James referred explicitly to the tendency among science and engineering students to disdain the work of students in other disciplines. He himself emphasized the benefits of respecting them.

> *James, a CiE student*
> James: One thing that has always annoyed me is engineers in general having a chip on their shoulder. Oh we say "our majors are harder. We have real majors. We are going to get real jobs"... I feel if you broaden your horizons by doing literature and art and music then you can communicate to other people better and that that's where it really helps you... if they [engineers] would understand that, they would have more of a respect for like you know the other majors, and it would be really beneficial for them...If your whole focus is on concrete, [if] your whole intellectual focus is on a piece of concrete, that is a depressing prospect for life. A lot of engineering majors miss that. They look at majors at the [arts building] "Get a haircut and get a job." They don't get the point that art is what it is about.

The negative attitude toward other disciplines that I observed not only among civil engineering majors but also among students in the zoology courses is fully

illustrated in the following conversation taken from the first interview I conducted during the pilot project for this study. It was a group interview with four junior Civil Engineering majors. Their discussion of the differences between writing in the humanities and in Civil Engineering touched on the themes I would hear repeated by students in all three courses in the full study. For example, they claimed that in writing assignments for English classes they could "just make stuff up." They highlighted the difference they perceived between the "real" knowledge which they wrote about in engineering, and the indeterminate knowledge they had encountered in English classes. Like Liz, this group pointed out that the personal, possibly emotion-laden, perspectives writers could express in English assignments were –to their great relief – out of place in engineering.

In their preference for the "real" and their strenuous rejection of the personal, these students connected disciplinary differences not only to disciplinary values, but to their sense of their own identity. They elaborated on their sense of themselves as realists focused on objective knowledge by spontaneously pointing out how this preference carried over into their reading habits.

> Joleen: Tell me about writing general. What significant experiences have you had with writing?
> Ed: I have a writing disability that I was diagnosed in high school and that is one of the reasons why I thought being an engineer would be easy. I write way more now than I ever have before! But it's too late now. ...You know when I was writing English papers on books, I could just make stuff up. But the thing is, I'm not a very good, like, at making things up. ...If it doesn't exist, I am probably not going to say it. I'm very technically [oriented] "this is what it is, this is what it means, this is the outcome." So I find it still a struggle, but it is still achievable to write a technical paper so
> Joleen: OK that's a very interesting point.... differences you might perceive between other

Jeff: I like writing this type of material better cause I'm not a very touchy feely kind of person, and it seems like in English 401 it's kinda a lot of like doing that. It gets your emotions out and "tell your feelings" and all that stuff. I'm just like "I don't want to have anything to do with that," and I don't want to write anything like that type of stuff. This [the lab report] [is] all concrete kind of technical stuff that's real and there's no "ifs ands or buts" about it... And I can I feel more comfortable writing about things like that than I do about touchy-feely type things.

Joleen: OK

Ed: [interrupts in a sing song cadence] "What do you think the author meant?" I don't know!

Sheldon: I HATE those.

[All laugh]

Sheldon: To reflect on some piece of literature - that's just, that's brutal. But I can totally write, you know, a lab report and discuss the results and tell you about what it means and tell you ahh "because this soil has this density that it is probably good or not good for whatever usage," you know. That's fine; that's doable...

Ed: That makes sense

Sheldon: It's a lot easier for me and a lot more enjoyable for me to do that than to write about [what] some poet was thinking when they wrote some sonnet or something. [Laughter]

Joleen:...What is really interesting to me is how you characterize other kinds of writing.... The personality that you have or the way you like to think about things affects the kind of writing that you like to do

Bob: I'd say so.

Jeff: I'd say so.

Ed: That also reflects what I would enjoy reading...

Sheldon: I'd say that too

Ed: I'll read the newspaper, but I don't read novels. I'll sit down with the *New York Times* and I'll read something about whatever, and it totally makes sense to me. But I would do that any day over... getting a book at the library and reading about - I don't even know because I would never do it.

[Laughter]

Sheldon: I do read novels but...I would never touch like, you know, romance type stuff or any of that. It's all stuff that's historical fiction, but like good historical fiction or some fantasy stuff.... But ...if it gets too abstract, I don't like it. If it's writing that's real, that I can like relate to and maybe sort of apply to based on how my life is now, I enjoy reading it. But I also like reading a lot of like more technical stuff....Like I ... flip through Civil Engineering magazines and read I dunno 50% of it because you just don't read all the details. Or like a tools catalog or tool specifications...is just more enjoyable to me.

> Joleen: Bob, your thoughts? [I prompted Bob to join the conversation because I realized belatedly that although all were lab partners in the Soil Mechanics lab I was observing, the other three were close friends and Bob was new to the group.]
> Bob: I've actually usually enjoyed writing for most things. I don't like the touchy feely, create-a-story sort of thing, but I like forming an argument and forming like putting things together to create something from thoughts. And I like reading things like not just a planned story, but that make you think or make you follow - like a mystery or like a report. ... I like things that make you have to think about them, maybe read a second time or think about later on and try to figure something out.

I included Bob's perspective at the end of this conversation excerpt to achieve a more balanced presentation of civil engineering majors. Like James, quoted previously, Bob offered some appreciation of the value of humanistic ways of knowing when he said he enjoyed the work of creating things "from thoughts." However, I included this lengthy excerpt primarily to demonstrate just how strongly some students preferred scientific ways of knowing to other ways, and how those preferences were expressed in both their reading and writing practices.

Such bias in favor of one's own discipline limits possibilities for cross-disciplinary collaboration. Teachers in every discipline need to work to prevent such prejudice because, as James emphasized, few people and few careers are so narrow that respect and appreciation for other modes of working and writing are not needed. For example, Josselson and Leiblich, editors of the psychology research journal annual, The Narrative Study of Lives, describe their experience working with writers who were limited by a narrow focus on scientific ways knowing

> ...we struggle with helping our psychology-trained authors to stop using passive voice, bloodless prose, and hedged statements. But these habits are exceedingly difficult to unlearn, even when they are utterly inappropriate to the ideas these authors wish to convey. We would argue for the necessity of teaching that writing should suit content and of training

> students in a range of styles so that they may have freedom to choose the one that best fits the nature of their research. (652)

Josselson and Leiblich observed that writers with long practice using style conventions rooted in an objective epistemology had difficulty embracing narrative modes of investigation "which take hermeneutics rather than logical-positivism as a philosophical base" (651). Their overall argument was that teaching psychology students to use only APA style socializes them into a way of thinking that is damagingly narrow. They compare it to "using language as a straitjacket" and "the intellectual equivalent of footbinding" (652).

Devitt advocates the explicit teaching of genre awareness in part to address this kind of problem. She writes, "If teachers are to help minimize the potential ideological effects of genres, they must help students perceive the ideology while they are encountering the genre" (196). Participants in my study had not received this kind of help, and I found that they had developed very little awareness of the ideology embedded in the advanced lab report. As summarized in Table 5.3, only nine of the 24 interviewees made at least one statement that I interpreted as indicating relatively high awareness of ideological effects, and these were often halting and indirect connections of beliefs and values to language conventions. Further, comments by several students (such as Barbara, James, and Sherry) suggested that uncritical acceptance of the lab report genre's beliefs and values had occurred and may have contributed to prejudice against other ways of knowing. My study provides partial support for Devitt's contention that genre awareness might minimize the potential ideological effects of genres by showing that uncritical acceptance of ideology can cause problems. By clarifying that the discourse conventions and practices of all disciplines – including scientific ones – are socially-constructed and

based on a community's values and beliefs, genre awareness might unseat or even prevent a close-minded rejection of other ways of knowing.

Conclusion

Advocates of explicit teaching of genre awareness make a number of claims about its potential benefits: transfer of learning, rhetorical flexibility, a critical consciousness of generic forms and the disciplinary beliefs and practices they represent. My assessment of genre awareness among students learning to perform the advanced lab report also produced observations that shed light on these predicted benefits. The limitations of my study design prevent me from making conclusions about whether genre awareness produced these benefits among study participants. Nevertheless, the observations I made provide empirical evidence of what these benefits might look like and why they might be needed.

Based on my data, I speculate that genre awareness is a tool that a motivated student might use to obtain any of the four benefits considered in this chapter. In other words, the usefulness of genre awareness and the benefits it might bring depend on the goals and purposes of the student. Advocates of genre awareness seem to assume that all students want to take a critical stance toward their learning and are motivated to achieve their own ends for their writing. However, Sophia's story showed that some might be content to perform genres that are defined and shaped by others, so they might have little desire for genre awareness while working within the classroom context. Students with strong disciplinary identification and a focus on the professional context for their writing would be most likely to seek genre awareness and the benefits it may bring.

The idea that there may be students who benefit from developing genre awareness and some who don't has been a thread woven into this dissertation from the very beginning. It came up in my first conversation with the Chair of the Civil Engineering Department, it was pointed out in Johns' article that helped to frame my research questions, and it rests at the heart of Friere's Pedagogy of the Oppressed which I first encountered in my Master of Arts program. As we discussed the goals of the civil engineering curriculum, the Chair of the Civil Engineering Department described his perception of the difference between technicians and engineers. I was struck by how his words echoed the contrast between writers who learn to produce generic text types (genre acquisition), and those who participate intentionally in the mutual shaping of genre and social context (genre awareness). The Chair explained that engineering technicians learn to apply equations in familiar settings, but are not prepared to figure out what to do in novel situations. In contrast, professional engineers learn the principles involved in construction so that they are capable of solving problems they have never encountered before.

The Chair's engineer-technician comparison also reminded of me with the contrast between Freire's responsible Subject and dehumanized object (67), and Johns' distinction between training and education (239). Using Johns' labels, an analogy to the Chair's idea could be expressed as a comparison between educated writers and trained writers. Trained writers learn how to generate specific generic text types, but cannot question or provide a rationale for the rules that they follow to produce them. In contrast, educated writers learn to be critically conscious of the ideological implications and

rhetorical purposes of generic forms, so they are capable of explaining and shaping the genres they participate in.

Like Johns, as a writing teacher I would prefer to aim for education rather than training, for teaching genre awareness rather than teaching genre acquisition. However, my study suggests that from a student's perspective, training may at times be more appealing, particularly when the genre being used does not relate to the student's personal goals or plans. Research that attempts to assess the effectiveness or benefits of explicit teaching of genre awareness needs to take into account the role of student motivation in enhancing or limiting outcomes.

CHAPTER VII

CONCLUSION

In this dissertation, I have pursued a single primary research question and two supporting ones. My overall purpose of assessing student genre awareness was an attempt to capture a much-discussed theoretical and pedagogical concept and subject it to the scrutiny of empirical research. In this concluding chapter, I will discuss the effectiveness of my method for assessing genre awareness, reflect on the answers I have found to my research questions, and consider directions for future research.

Effectiveness of the Method for Assessing Student Genre Awareness

A primary assumption of my approach to assessing genre awareness was that because it is essentially metacognition about writing, evidence of an individual's genre awareness would be revealed in what they could say in response to questions about writing. To develop assessment questions, I relied on Devitt's definition of genre awareness as "a critical consciousness of both rhetorical purposes and ideological effects of generic forms" (192).

Review of Assessment Method

My methodology for assessing genre awareness consisted of two parts. The first was collecting evidence of genre awareness, primarily through interviews with students about their participation in the advanced lab report genre. The second part of my methodology was analyzing student statements in order to draw conclusions about the

genre awareness of individuals. In the following section, I will reflect on each of these parts in turn.

Table 7.1

Outline of Method for Assessing Genre Awareness

Collecting Data

1. Define genre awareness as a critical consciousness of rhetorical purposes and ideological effects.
2. Choose a focal genre, in this case the advanced lab report.
3. Identify the ideology that is embedded in salient genre conventions of the focal genre.
4. Identify the rhetorical purposes of the focal genre.
5. Develop questions that invited students to provide a rationale for the genre conventions I had identified and to explain their understanding of the rhetorical purposes of the focal genre.
6. Ask the questions in surveys and in interviews.

Analyzing Data

1. Examine the data collected to identify questions that most participants answered and that addressed awareness both of ideological effects and of rhetorical purposes.
2. Select the most fruitful questions as indicators of genre awareness.
3. Compare and rank student responses to these indicators.
4. Combine all individual rankings in order to assess overall genre awareness for each student.
5. Compare and rank students according to their overall genre awareness.
6. Look for patterns of similarity and difference between students with the highest and the lowest overall genre awareness.

Data Collection Issues

Navigating the Dual Social Context of the Advanced Lab Report. Steps 3 and 4 in my process of collecting data were crucial decision points that shaped what I observed in my study. The choices I made led me to emphasize the professional context for the genre of the advanced lab report, and to overlook student awareness of ideology or rhetorical purposes that belonged exclusively to the classroom social context.

The overlap between the social contexts of classroom community and professional community was a point of tension throughout my project. Shifting the focus

from professional context to classroom context would also shift the role of the student writers and of the genre itself. Students were full participants in the classroom context, and, by this point in the academic careers, all of the study participants were quite experienced in the student role. Using a term employed by Lave and Wenger and by Dias et al., the upper-level students I observed would be considered "old-timer" participants in the classroom context. They understood the classroom's rhetorical exigencies, and they had long ago accepted its beliefs and values. However, they were "newcomers" to the professional social context of the advanced lab report. Some had first-hand experience with the professional context through work, internships, or independent study, but none could be considered full-fledged members of the professional community

Likewise, the advanced lab report had a dual nature. Within the classroom context it was a school assignment, and so would be a variant of a genre that would be quite familiar to students. Its rhetorical exigency and the ideological effects of performing it would be the same as those of any other classroom assignment. In other words, its different discourse conventions would simply constitute the particular details of the grading rubric, but the overall function of the genre would be the same as any other classroom assignment: to earn a grade as defined by the rubric and to reinforce course content. The advanced lab report would constitute a new genre for students only if it was envisioned as a research report within the professional context where it would function to transmit knowledge.

Focusing on the classroom context for the advanced lab report would not have achieved my intention for this study, which was to observe students in the midst of learning a new genre. This intention guided the choices I made in the process of

collecting and analyzing data. In addition, as I argued in Chapter Three, my choice to focus on the professional context was appropriate because the conventions of the advanced lab report were not arbitrarily chosen. They were modeled on the conventions of the professional research report. A similar research methodology could be followed for studies of student genre awareness that use a different focal genre. Choosing a different genre that is also modeled on a professional one would be the most straightforward adaptation of this methodology. However, the method could also be used with a focus on the classroom context if interview and survey questions were developed that invited students to talk about their understanding of the rhetorical exigencies of the classroom and the beliefs and values motivating their participation in it.

By choosing to focus on the professional context for the advanced lab report, my assessment method favored students who had experience or a strong interest in that context. Students who referred to the professional context to explain genre conventions were ranked as having higher genre awareness than students who did not. Therefore, it is not surprising that students with strong disciplinary identification and/or professional mentoring would have been ranked as having higher genre awareness. Also, it is possible that the genre awareness I observed among struggling writers was also related to their interest in the professional context. Their commitment to joining the professional discourse community likely motivated them to persist in their studies and to cope with their difficulties with writing.

My methods also revealed less easily predicted findings. One is simply that it was possible for students who had not yet had professional experience to draw on the ideology and rhetorical purposes of the professional context in order to give reasons for

the genre conventions they were learning in the classroom. However, being able to explain genre conventions in terms of the professional context did not seem to be necessary in order to perform the genre in an acceptable way. Experienced students performed the genre of the advanced lab report without referring to the professional context to explain the genre conventions. Conforming to the rubric was sufficient.

In planning the study, I set out to distinguish between students who demonstrated genre awareness and those who did not. As I carried out the study, I realized that I was not making this simple distinction. I was also distinguishing between students who focused on the classroom context and those who could also envision the professional context. Students I ranked as having "no awareness," may actually have had awareness of the classroom social context for the genre. However, for an assignment like the advanced lab report that is modeled on a professional genre, I believe this approach was appropriate. I would use it in future studies because I recognize this limitation and would be able to adjust the questions I would ask in order to elicit the kind of genre awareness I wanted to examine (either of the professional context or of the classroom context).

Developing Interview and Survey Questions. My method for assessing student genre awareness was exploratory. I did not know which questions would be most fruitful until I had tried them. Questions that became indicators of genre awareness emerged from my analysis of the data.

Direct questions about discourse conventions and students' writing process (such as asking participants to explain why they might avoid using first person pronouns) had both advantages and disadvantages. For example, asking participants which section of the lab report they would write first could produce a deceptively simple response. In

Barbara's case, she replied to direct question about writing process by insisting that she would write the lab report straight through from beginning to end. However, at a different point the in the interview, she described a more recursive writing process.[1]

During the interviews, I discovered a similar weakness of the survey question "Which section do you begin to write first?" When I compared answers to the survey question with students' narratives of their writing process during the interview, I realized that some students who said they began "writing" with the introduction on the survey actually reported during the interview that they instead began their process by analyzing the data. However, they did not consider that to be writing. "Writing" seemed to be reserved for creating text, not for creating graphs or generating ideas about what the graphs might mean. A better survey question might have been to ask students to list the steps they followed when preparing the lab report.

These examples show that incorporating more than one opportunity for students to talk about key genre conventions would be important to this method of assessing genre awareness. Student answers to direct questions need to be compared for consistency with their responses to more open-ended prompts, such as narrative accounts of their writing process or comparing model sentences.

A consistently useful questioning strategy during the interviews was to show students a list of possible phrasings and ask them to choose the one from each set that

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[1] When describing why she had to narrowly focus the introduction, Barbara explained that it could not stray from what she would include in the other sections of the report. She gave an example of how the results section would limit what she could cover in the introduction, which implied that she would have worked on the results section before completing the introduction. She talked about how she had to "go back and forth" between the different sections of the lab report as she composed it. "So you also have to go back and forth between parts of your paper. And [if] you are trying to just look at territoriality, if that is what your results are showing, you want to be able to link the territoriality to your introduction and use your introduction to support your results. So if you have so much in your introduction then you kind of get lost going back and forth."

was most appropriate for an advanced lab report. (see Examples for Discussion in Tables 2.7 and 2.8 or in Appendix D .) The advantage of this approach was that all students saw the same options, and that they could draw on their sense of what was appropriate and make a choice, even if they had difficulty in giving an explicit rationale. Being confronted with different possible phrasings helped students clarify their reasoning and it gave me the opportunity to ask follow-up questions about their choices.

My assessment method could also be improved by broadening it to include questions aimed at evaluating students' "critical consciousness." The questions I used to explore student awareness of the rhetorical purposes and embedded ideology of the advanced lab report did not directly address the "critical consciousness" aspect of Devitt's definition of genre awareness. However, as students talked about differences between writing in different disciplines, this component of the definition turned out to be important. Critical consciousness makes genre awareness more than rhetorical savvy. It involves being able to explain why rhetorical moves are made or why genre conventions are followed, or even violated. Genre awareness as defined by Devitt, Johns, and others posits an active, engaged writer who is building a "mental schema" of how a genre works. In future, I would want to pursue this component of genre awareness more directly and thoroughly. For example, I could have asked students to define good writing or to explain what makes writing effective. I also might have asked clarifying questions to follow-up on my perception of prejudice against non-scientific ways of knowing in some student statements.

Data Analysis Issues

Maintaining a Focus on Connecting Conventions to the Social Context. As I studied interview transcripts for evidence of awareness of ideological effects or rhetorical purposes, I risked conflating students' understanding of disciplinary ideology or of the report's rhetorical purpose with their awareness that discourse conventions shape and are shaped by the ideology and the rhetorical purposes of the social context for the genre. This tension was analogous to the danger of understanding genre awareness as merely genre acquisition. As a result, I want to emphasize that future use of my data analysis method must avoid focusing on what a student knows about ideology or rhetorical purposes, and look instead for whether students can make connections between genre conventions and the genre's social context.

An example from my study illustrates this subtle issue. In assessing student awareness of the rhetorical purposes of the advanced lab report, I wanted a ranking of "no awareness" of rhetorical purposes to mean that the student did not refer to purpose or audience to explain genre conventions. I did not want it to mean that he or she did not understand the purpose of the lab report or that he or she did not have rhetorical skills. I did not intend to measure student knowledge of rhetoric or how they might have used rhetoric when writing reports. Nevertheless, Indicator 4[2] can be construed as simply understanding the purpose of the lab report, even though I intended to use it as a way to invite students to refer to rhetorical purpose when explaining why the conventions of the advanced report were different from those of previous, introductory reports.

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[2] Indicator 4: Comparing the Advanced Report to Introductory Reports

Synthesizing the Components of Genre Awareness. The fourth step of analyzing my data involved bringing together my observations about each student's awareness of rhetorical purposes and ideological effects. This synthesis was challenging because the quality of the data I collected for these two components of Devitt's definition of genre awareness was not comparable. Giving equal significance to each component would have been ideal. However, the questions I used and the responses students offered resulted in giving greater weight to student awareness of ideological effects than to awareness of rhetorical purposes.

As mentioned in Chapter Two, I did not have a direct question that invited students to explain rhetorical purposes that was as clear and narrow as the question about the rationale for first person pronoun use. I had initially included an additional measure of awareness of rhetorical purposes. In my first attempt to analyze the interview data, I used students' identification of the audience for their lab reports as an indicator of awareness of rhetorical effects. I had intended to rank envisioning a professional audience as high awareness, naming a TA or peer as low awareness, and indicating that the student never thought about audience as "no awareness." However, on reflection I eliminated this indicator because I realized that it was more a measure of whether students focused on the classroom social context or the professional social context. It did not shed light on how they explained lab report conventions. In future, my assessment methodology would be strengthened by developing more and better questions about rhetorical purposes.

Of the six indicators of genre awareness I selected, some were more meaningful than others, yet I decided to give them equal weight in my analysis. Table 7.2 reviews the

indicators of genre awareness used in this study.

Table 7.2

The Six Indictors of Genre Awareness Used in This Study

Indicators of Awareness of Ideological Effects were student statements...	
Indicator 1	...responding to direct question about first person pronoun use
Indicator 2	... responding to direct question about citation practices
Indicator 3	... comparing lab reports to other kinds of writing
Indicators of Awareness of Rhetorical Purposes were student statements...	
Indicator 4	...comparing the advanced lab report to introductory reports
Indicator 5	... referring to reader needs to explain lab report conventions
Indicator 6	... referring to rhetorical purpose to explain lab report conventions

Indicator 1 about first person pronoun use was the most useful direct question because it focused on a prominent genre convention that was clearly related to ideology, every student responded to it, and it could be separated into categories of none, low, and high awareness. All of the other indicators lacked one or more of these characteristics. My method did not include a means to account for this difference in the quality of the indicators, so my synthesis of the two components may have over-emphasized responses to Indicator 1. In future, identifying more indicators or giving more weight to effective ones might improve the data analysis method.

As I reviewed student responses to my questions about embedded ideology, I noted an overlap between my admittedly artificial separation of "awareness of rhetorical purposes" and "awareness of ideological effects." The overlap occurred because within a discourse community, the ideology embedded in discourse is also very likely to be represented in the needs and expectations of readers. People as well as genre carry ideology. Often students would explain the convention I asked about by talking about the

needs of a reader or the purpose of a report. In other words, they gave a rhetorical explanation rather than an ideological one. For example, some student responses to questions about first person pronoun use and about citation practices, which I expected to use as evidence of awareness of ideological effects, focused on rhetorical concerns.[3] Similarly, when Liz explained that, compared to English assignments, lab reports "must conform to what everybody else expects to see," I interpreted her statement as connecting genre conventions to the disciplinary belief that knowledge must be validated by the scientific community. However, I could also have interpreted it as connecting genre conventions to reader needs and expectations and thus counted it as evidence of awareness of rhetorical purposes instead of ideological effects. This observation reveals the subjective nature of my analysis. Another researcher attempting to use this methodology might make different choices about how to interpret student statements.

Overall, I conclude that the assessment tool that I developed generated rich observations of student perspectives about learning to perform a new genre that have implications for understanding student genre awareness. However, I did not develop an assessment instrument that could be readily used by other researchers to produce consistent evaluations of student genre awareness. Further research based on this dissertation may permit the development of such a tool.

Reflections about Research Questions

In this section I will revisit the three questions that have guided my research. Before summarizing my findings about student genre awareness, I want to reiterate my

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[3] I ended up including these statements as indicators of awareness of rhetorical purposes. See Indicator 1: Referring to Reader Needs to Explain Lab Report Conventions and Indicator 2: Referring to Rhetorical Purpose to Explain Lab Report Conventions in Chapter Three on pp 95-102.

conception of this elusive concept. My project was based on Devitt's definition of genre awareness as "a critical consciousness of both rhetorical purposes and ideological effects of generic forms" (192). Despite their experience participating in a variety of genres, study participants would likely have found the language of that definition to be incomprehensible. I could not have asked them directly about genre awareness. In my attempt to assess their genre awareness, I often resorted to focusing on what they could say about disciplinary ideology and rhetorical purposes when they explained the conventions of the advanced lab report. However, I want to emphasize that genre awareness **not** is the same thing as knowing what the embedded ideology and rhetorical purposes of a genre are. Genre awareness is more fundamental and flexible than knowing about a specific genre or disciplinary community. It is knowledge that leads to a way of seeing that is independent of any one genre or social context. It is the recognition that genres are responsive to and shapers of the social contexts in which they function.

Research Question 1: The Range of Variability of Genre Awareness

Using the assessment methods I developed, my study showed that very few students demonstrated genre awareness; in fact, only one did. In this project, genre awareness was demonstrated if a student received rankings of "high" for two or more indicators for both components of genre awareness (ideological effects and rhetorical purposes). This was true only of Liz. However, only one student was found to have a complete lack of genre awareness. Nina alone received rankings of "no awareness" for both components.

The total number of "high" rankings for the 24 participants across all six indicators ranged from zero to four, with most students showing some awareness of at least one of the components of Devitt's definition of genre awareness. Four students

showed relatively high genre awareness, with an equal number showing relatively low genre awareness. Eight students received "high" rankings for at least one indicator of both components of Devitt's definition. The remaining 16 students were not considered to demonstrate genre awareness as defined by Devitt because they did not demonstrate awareness of both ideological effects and rhetorical purposes of lab report conventions.

The strongest finding from my assessment of student genre awareness was that more students could link genre conventions to rhetorical purposes than could link them to ideological effects. Nineteen out of the 24 interviewees had at least one "high" ranking for rhetorical effects, while only nine had at least one "high" ranking for ideological awareness. The relative difference gets even larger when the more stringent criterion of two rankings of "high" is applied. Only three students had two or more "high" rankings for ideological effects while nine had two or more "high" rankings for rhetorical awareness. Only two students showed no awareness of rhetorical purposes, whereas five students showed no awareness of ideological effects.

I think the most likely explanation for the greater awareness of the rhetorical purposes shaping the advanced lab report is that study participants may have received explicit teaching about rhetoric in their previous writing classes. It is also possible that awareness of rhetorical purposes precedes or contributes to awareness of ideological effects. Only one student, Frank, showed a strong awareness of ideological effects without any "high" rankings for awareness of rhetorical purposes. In all other cases, students who showed awareness of ideological effects also had awareness of rhetorical purposes, so rhetorical awareness may have preceded ideological awareness.

My assessment of genre awareness and my impressions from the interviews also indicated that students could perform the genre of the advanced lab report in the classroom context without having much, if any, awareness of the ideological effects of the genre's conventions. Sophia's story is the clearest example of this, but the finding that only three interviewees received two or more "high" rankings for awareness of ideological effects also supports this observation. In addition, all interviewees were receiving average to good grades on their reports, and most did not exhibit awareness of ideological effects.

Research Question 2: Factors That Might Help Students Gain Genre Awareness

To identify factors that might have contributed to the development of the genre awareness I had observed, I looked for patterns that distinguished the group of students I ranked as having the highest genre awareness from the group I ranked as having none. Five possible contributing factors emerged from the literacy and disciplinary background segment of the interviews. Of these, two factors—mentoring and disciplinary identification—exhibited a pattern of association with the rankings I had made of student genre awareness. Of the two, mentoring showed the more tentative association. None of the four students ranked as having no genre awareness had received mentoring from an expert in their field, while three of the four students in the high genre awareness group had. However, when the "high genre awareness" group was expanded to include the additional four students who had at least one high ranking for each component of genre awareness, the pattern broke down. When the eight students were considered together, there was no pattern of association because four reported receiving mentoring, while four did not.

The strongest pattern of association was between disciplinary identification and genre awareness. All eight students who had at least one high ranking for each component of genre awareness identified strongly with the discipline they were studying and had clear career goals. However, three students in the "no awareness" group reported low commitment to the discipline, and all four were uncertain about their post-graduation career plans. The significance of this finding was strengthened by the fact that among all 24 interviewees, only seven did not express a strong disciplinary commitment, and none of these were ranked "high" on any of the indicators of awareness of ideological effects. Nevertheless, five of them were ranked high on one or more indicators of awareness of rhetorical purposes. This suggests that disciplinary commitment may be a contributor to the development of genre awareness, and perhaps of awareness of ideological effects in particular.

A third factor, student confidence in their writing, was remarkable due to the lack of a consistent pattern of association with the genre awareness rankings. Most groupings of students according to genre awareness—those with relatively high genre awareness, those with relatively moderate awareness, and those with high awareness only of rhetorical purposes—included both confident writers and those who reported that they were "not good at writing." Interestingly, the only cluster that included only confident writers was the group of four students who were ranked as having no genre awareness. These findings suggest that genre awareness—at least the genre awareness I measured in this study—was not associated positively with writing confidence. This observation entails two further implications. First, students who feel that they write well in college might have no need for or interest in developing genre awareness. Secondly, my study

does not indicate that increased genre awareness will directly result in increased confidence or improvement in student writing.

It was not surprising to me that students like Taylor, Liz, and Robyn who enjoyed writing might exhibit genre awareness. I expected that the work of confident writers would be guided by their explicit understanding of the "range of choices as well as set of constraints" (Devitt 200) present within the genre of the advanced lab report. However, I did not expect to find that students like Nishan, Sherry, and Paul who saw themselves as struggling writers would have genre awareness, and especially that the extent of their genre awareness would outstrip that of more confident writers like Sophia and Nina. Further research is needed to confirm this unanticipated observation because the patterns of association it is based were drawn from a comparison of so few students (four in each group).

Research Question 3: Student Experiences and the Rationale for New Pedagogies

In Chapter Six, I discussed four potential benefits of genre awareness that advocates of explicit teaching of genre awareness have predicted their proposed pedagogies might foster: transfer of learning, rhetorical flexibility, freedom to make discursive choices within the constraints of a genre, and preparation to resist or knowingly accept the ideology embedded in a genre. Because of the limitations of the data I collected, I could not evaluate whether the genre awareness I observed benefitted students in any of these ways. However, the interview data did provide student perspectives and accounts of experiences that illustrated the need for these benefits.

I found limited evidence of students transferring what they had learned about writing in other contexts to the new situation of learning to write the advanced lab report.

Only five out of 24 interviewees said they drew on previous writing experiences when writing their lab reports. In this way, my data suggest that current teaching practices may not be preparing students to draw on previous writing experiences when faced with new ones, so changes in writing pedagogy may be warranted.

My consideration of rhetorical flexibility focused primarily on investigating whether students were able to change their writing process, if needed, to effectively meet the demands of the advanced lab report. My findings showed that students who had previously received high grades on other kinds of writing assignments were likely to resist changing their writing process when needed compared to students who had been less successful in the past. This suggests that confident writers might have less flexibility in their writing process than students who are less secure about writing.

Regarding the benefit of enabling students to make intentional discursive choices, my observations led me to question the assumption that all students would see this as a desirable objective. Sophia's story illustrated that a student's motivation for learning a genre and her or his sense of disciplinary identity might be more important than awareness of how genres function in fostering students' sense of authority over their own writing.

Finally, my data highlighted some negative potential consequences of not preparing students to recognize the ideology embedded in genre conventions. Some student statements showed the power of genre conventions to exclude outsiders, while others revealed a burgeoning prejudice against the knowledge-making practices of other disciplines. Fostering genre awareness might be one way to weaken both of these barriers. Helping students to recognize that genre conventions are the product of social

interactions might enable them to see that the barriers genre conventions create might also be overcome by social means.

In my view, the most valuable potential benefit of genre awareness identified in this study was that it might work against the tendency toward disciplinary parochialism that I observed in students who had not yet even begun working in their chosen field. I was surprised by the emotionally-tinged and essentially uninformed disdain some students expressed toward the humanities and humanistic ways of knowing. By alerting students that disciplinary writing practices carry ideology, genre awareness has the potential to diminish prejudice and to prepare students to respect and work effectively with colleagues from other disciplines. Prepared to analyze genres in order to perceive underlying beliefs and values, students with genre awareness would be ready to consider ways that work in other disciplines might complement or enhance their own. This attitude is especially valuable given current interest in interdisciplinary research projects and initiatives.

Directions for Future Research

The model for assessing student genre awareness that I might use in future studies will likely be based on this project. However, my nascent methodology needs to be refined first. In particular, pilot studies are needed to find a better way to assess student awareness of the connections between a genre's discourse conventions and the rhetorical purposes of its social context. The survey I developed also could be revised to generate more useful information.

Eventually, I would like shift from relying primarily on interview data to assess genre awareness to relying more on a survey instrument. Creating a meaningful survey

questions about metacognition poses a significant challenge, yet I think a survey is needed. The data collected by a survey would never offer the richness of interview data. However, for limited purposes—for example, assessing specific genre awareness indicators—survey data may be useful. A survey that combines specific, close-ended questions with an opportunity for some open-ended elaboration might be ideal. Also, because surveys permit larger numbers of study participants, they might capture a broader range of student perspectives. This seems important because in the twenty-four interviews I conducted for this project, the experiences and attitudes about writing reported by students varied much more than I had expected among classmates with similar majors and career goals. In addition, surveys are a widely-used tool for evaluating pedagogy, which was my motive for evaluating genre awareness in the first place.

Additional studies of genre awareness using other focal genres are also needed. My own background in science plus the large body of research on scientific discourse led me to choose the lab report as the focus of this study. However, for the purposes of evaluating explicit teaching of genre awareness as a pedagogical approach, further research among students learning to perform other genres in a variety of disciplines would be helpful. Such work would entail identifying measurable indictors of genre awareness based on these other genres.

Further research that would build on this project might investigate more thoroughly the factors that might contribute to the development of genre awareness. At the outset of this study, I expected disciplinary identification, breadth of writing experiences, and experience doing discipline-related internships or independent study projects to contribute to development of student genre awareness. I found that one of the

strongest potential contributors to genre awareness was disciplinary identification. Mentoring also appeared to be an experience that distinguished students in the high awareness group from those ranked as having no awareness, and should be studied further. The potential importance of mentoring is supported by Thaiss and Zawacki's finding that ample individualized feedback contributed to disciplinary writing development. They also cite the importance of breadth of writing experiences. However, in my study breadth of experience was not consistently associated with high genre awareness. Further research might clarify this apparent dissonance.

In addition, the unanticipated finding that students who were not confident writers demonstrated genre awareness merits further study. Additional research could clarify whether the genre awareness I observed resulted from struggling with writing, or whether it was a pre-existing factor that helped students overcome difficulty.

I am also interested in researching two themes unrelated to genre awareness that emerged from the interviews I conducted for this project. I was surprised by how many of the students I spoke with were pursuing career goals they had cherished since childhood. Even more fascinating to me was how often students in both departments mentioned early experiences with books, writing, and television programs as being significant in shaping their career goals. In addition, several students also talked about ways that their parents had influenced their writing practices. These observations have made me curious about the long term impacts of early literacy experiences.

EPILOGUE

At the end of this dissertation I would like to return to the scene in the Zoology laboratory that prompted it and to the TA's words, "The writing you will do in this class is completely different from what you did in English 401. That was creative writing. This is technical writing. It is completely different."

What might I say to that TA now, in light of what I have learned from listening to and reflecting on the words of students about their experiences performing the advanced lab report?

I would want him to be aware of the dual nature of the social context of the advanced lab report. In assigning it, he is giving students an opportunity to earn a grade. However, he is also asking them to practice a rhetorical action that is central to the work of scientists and engineers: sharing the results of laboratory experimentation. Motivation for taking the course will lead some students to engage with the lab report as a classroom genre, while others will more readily see it as a professional genre. Although students enter his classroom with similar majors, they may have a surprising array of reasons for pursuing those majors. Many enter with a clear and specialized career plans. Some will have pursued a passionate interest in a particular species or kind of work since childhood. Students with strong disciplinary identification will likely focus on the professional context for the advanced lab report genre.

I would want him to acknowledge that some students will do better on this assignment than others for reasons that have little to do with effort and paying attention.

Confident writers may encounter frustration if familiar writing habits are not appropriate for the advanced lab report. The TA needs to be particularly aware of the common student practice of composing the lab report from beginning to end. He might persuade students to adopt a more professional approach by introducing the advanced lab report as an opportunity to broaden—rather than replace—their current repertoire of writing strategies. He could also point out that students who have had difficulty with writing in other contexts might find that the structure and style of the advanced lab report suit their particular strengths and aptitudes.

I would want to tell him that student writing is shaped--but not limited by--past writing experiences. As juniors and seniors, they may think that they already know how to write a lab report, but their expectations of what it involves are likely to vary and, most importantly, to be different from his. Expectations for the discussion section of the advanced lab report are substantially different from what many students have become used to in the learning-focused lab reports in introductory science courses. Students will likely need guidance regarding what the discussion section is supposed to do, and, in particular, regarding how its purpose is different from that of the results section. Because they have not had much practice interpreting data, writing a less formal, peer-oriented discussion section for one or more experiments might be beneficial.

I would not expect him to use the terms "genre," or "embedded ideology" or "rhetorical purpose" when talking to students about the advanced lab report. Explicit teaching about genre awareness would require a writing specialist with knowledge of rhetoric, genre theory, critical pedagogy, and writing studies, as well as experience analyzing a range of genres. However, I would want the lab TA to talk with students

about his own approach to writing research reports. Above all, I would want him to be able to give reasons for the conventions and practices that students must follow in writing the advanced lab report. I would want his grading rubric to specify not only what to do, but why.

Although students in my study did not exhibit a high degree of genre awareness, their stories revealed the at times bewildering complexity of the task they faced in learning to write the advanced lab report, and the potential benefits of a tool like genre awareness. Devitt, an advocate of explicit teaching of genre awareness, suggests that if student writers can discern the underlying ideology and rhetorical purposes that shape the content, styles, and structures of different genres, then they have a conceptual tool that will help them to find their way through the complex, dynamic, and sometimes tangled ecosystem of any genre. Along with Johns, Beaufort, and Downs and Wardle, Devitt believes that writers who possess genre awareness will be prepared to make connections between old and new opportunities for writing. According to Devitt, students with genre awareness would also be prepared to mine the writing expertise of their teachers. In turn, student questioning might encourage the kind of reflective praxis instructors need in order to become aware themselves of the ideological effects and rhetorical purposes of the too-familiar assignments they give and grade.

Despite the different kinds of writing experiences students bring to his class and the complexity of learning a new genre, I would tell the TA that he can support students' ability to "learn how to learn." He would not have to know how writing is taught in English 401 in order to help students build on what they learned in it. However, he would need to take time to debrief the writing practices and assumptions and beliefs about

writing that students bring into his course. He could invite them to talk about their previous writing experiences and to share their expectations for writing the advanced lab report. In response, he could point out which strategies would not work well or would need to be modified in his course. He could recommend additional resources. The TA might open such a conversation by saying, "The writing you will do in this class is completely different from what you did in English 401. That was creative writing. This is technical writing. It is completely different. However, the way you will learn to write these reports is similar to the way you learn to write any other new kind of writing project. Let's talk about writing you have done before, and your expectations about writing in this class..."

BIBLIOGRAPHY

Anson, Chris and Lee Forsberg. "Moving Beyond the Acdemic Community: Transitional Stages in Professional Writing." Written Communication 7 (1990): 200-31.

Bakhtin, Mikhail M. Speech Genres & Other Late Essays. Trans. Vern W. McGee. Ed. Caryl Emerson and Michael Holquist. Austin, TX: U of Texas Press, 1986.

Bawarshi, Anis. Genre and the Invention of the Writer: Reconsidering the Place of Invention in Composition. Logan, UT: University of Utah Press, 2003.

Bazerman, Charles. Shaping Written Knowledge. Shaping Written Knowledge: The Genre and Activity of the Experimental Article in Science. Madison: University of Wisconsin Press, 1988.

Beaufort, Anne. College Writing and Beyond. Logan: Utah State University Press, 2007.

Berkenkotter, Carol and Thomas Huckin. Genre Knowledge in Disciplinary Communication. Hillsdale: Lawrence Erlbaum, 1995.

Bhatia, V. J. Analyzing Genre: Language Use in Professional Settings. London: Longman, 1993.

Blakeslee, Ann M. "Activity, Context, Interaction, and Authority: Learning to Write Scientific Papers In Situ." Journal of Business and Technical Communication 11.2 (1997): 125-169.

Braine, George. "Writing in the Natural Sciences and Engineering." Academic Writing in a Second Language. Essays on Research and Pedagogy. Eds. Diane Belcher and George Braine. Norwood, NJ: Ablex, 1995. 113-134.

Bunn, Amoret. Message to the author. 21 Aug. 2006. E-mail.

Campbell, John Angus. "Charles Darwin: Rhetorician of Science." Landmark Essays on Rhetoric of Science: Case Studies. Ed. Randy Allen Harris. Mahwah: Lawrence Erlbaum, 1997. 3-17.

Carroll, Lee Ann. Rehearsing New Roles: How College Students Develop as Writers. Carbondale: Southern Illinois University Press, 2002.

Chiseri-Strater, Elizabeth. Academic Literacies: The Public and Private Discourse of University Students. Portsmouth, NH: Boynton/Cook Publishers, 1991.

Christie, Frances. "Literacy in Australia." Annual Review of Applied Linguistics 12 (1991): 142-155.

Coe, Richard M. "The New Rhetoric of Genre: Writing Political Briefs." Genre in the Classroom: Multiple Perspectives. Ed.Ann Johns. Mahwah, NJ: Lawrence Erlbaum, 2002.197-207.

Connors, Robert J. "The New Abolitionism: Toward a Historical Background." Reconceiving Writing, Rethinking Writing Instruction. Ed. Joseph Petraglia. Mahwah, NJ: Lawrence Erlbaum, 1995. 3-26.

Cox, Michelle. "When the Workplace is on Campus: Learning to Write for a University Speech Language Clinic." Diss. U of New Hampshire, 2006. Print.

Crowley, Sharon.Composition in the University: Historical and Polemical Essays. Pittsburgh: University of Pittsburgh Press, 1998.

Devitt, Amy. Writing Genres. Carbondale: Southern Illinois UP, 2004.

---, Mary Jo Reiff, and Anis Bawarshi. Scenes of Writing: Strategies for Composing with Genres. New York: Pearson Longman, 2004.

Dias, Patrick. "Writing Classrooms as Activity Systems." Transitions: Writing in Academic and Workplace Settings. Eds. Patrick Dias and Anthony Pare. Cresskill, NJ: Hampton Press, 200. 11-29.

---. Aviva Freedman, Peter Medway, and Anthony Pare. Worlds Apart: Acting and Writing in Academic and Workplace Contexts. Mahwah, NJ: Erlbaum: 1999.

Downs, Doug and Elizabeth Wardle. "Teaching About Writing, Righting Misconceptions: (Re)Envisioning 'First Year Composition' as 'Introduction to Writing Studies.'" College Composition and Communication 58.4 (2007): 552-584.

Dudley-Evans, Tony. "Variation in Communication Patterns Between Discourse Communities: The Case of Highway Engineering and Plant Biology." Language, Learning, and Success: Studying Through English. Ed. G. M. Blue. London: Modern English Publications in association with the British Council, Macmillan, 1993. 141-147.

Fahnestock, Jeanne. "Accommodating Science: The Rhetorical Life of Scientific Facts." Written Communication 15.3(1998): 330-350.

Flowerdew, John. "Genre in the Classroom: A Linguistic Approach." Genre in the Classroom: Multiple Perspectives. Ed. Ann Johns. Mahwah, NJ: Lawrence Erlbaum, 2002. 91-102.

Freedman, Aviva. "'Do As I Say: The Relationship Between Teaching and Learning New Genres." Genre and the New Rhetoric. Eds. Aviva Freedman and Peter Medway. Bristol, PA: Taylor and Francis, 1994. 191-210.

Freire, Paulo. Pedagogy of the Oppressed. 30th anniversary ed. Trans. Myra Bergman Ramos. New York: Continuum International, 2007.

Geller, Anne. "'What's Cool Here?' Collaboratively Learning Genre in Biology." Eds. Charlie Moran and Anne Herrington. Genre Across the Curriculum Logan, UT: Utah State UP 2005. 83-108.

Haas, Christina. Learning to Read Biology: One Student's Rhetorical Development in College." Written Communication 11.1(1994): 43-84.

Harwood, Nigel. "'Nowhere Has Anyone Attempted ... In This Article I Aim To Do Just That': A Corpus-Based Study of Self-Promotional 'I' and 'We' in Academic Writing Across Four Discipines." Journal of Pragmatics 37 (2005): 1207-1231.

---. " 'We Do Not Seem To Have a Theory...The Theory I Present Here Attempts to Fill This Gap': Inclusive and Exclusive Pronouns in Academic Writing." Applied Linguistics 26.3 (2005): 343-375.

Herrington, Anne. "Writing in Academic Settings: A Study of the Contexts for Writing in Two College Chemical Engineering Courses." Research in the Teaching of English 19 (December 1985): 331-61.

---. and Charles Moran, eds. Genre Across the Curriculum. Logan, UT: Utah State UP, 2005.

Hilgers, T. L., E.L. Hussey, and A. S., M. Stitt-Bergh. "'As You're Writing You Have These Epiphanies:' What College Students Say About Writing and Learning in their Majors." Written Communication 16.3 (1999): 317-353.

Hyland, Ken. Disciplinary Discourses: Social Interactions in Academic Writing. Ann Arbor: Univ. of Michigan Press, 2004.

Hyon, Sunny. "Genres in Three Traditions: Implications for ESL." TESOL Quarterly 30 (1996): 693-722.

Janesick, Valerie. "The Choreography of Qualitative Research Design: Minuets, Improvisations, and Crystallization. Eds. Norman K. Denzin and Yvonna S. Lincoln. Strategies of Qualitative Inquiry. 2nd ed. Thousand Oaks, CA: Sage Publications, 2003. 46-79.

Johns, Ann M. "Genre Awareness for the Novice Academic Student: An Ongoing Quest." Language Teaching 41.2 (2008): 237-252.

---. "Introduction." Genre in the Classroom: Multiple Perspectives. Ed. Ann Johns. Mahwah, NJ: Lawrence Erlbaum, 2002. 3-13.

Josselson, Ruthellen and Amia Lieblich. "Fettering the Mind in the Name of Science." American Psychologist 51.6 (1996): 651-652.

Kvale, Steinar. Interviews: An Introduction to Qualitative Research Interviewing. Thousand Oaks, CA: Sage, 1996.

Leverenz, Carrie Shively. "Citing Cyborsources: A Challenge to Disciplinary Values." Computers and Composition 15 (1998):185-200.

Martin, J.R. "Genre and Literacy—Modeling Context in Educational Linguistics." Annual Review of Applied Linguistics. Ed. William Grabe. New York: Cambridge UP, 1993. 141-172.

McCarthy, Lucille Parkinson. "A Stranger in Strange Lands: A College Student Writing Across the Curriculum." Landmark Essays on Writing Across the Curriculum. Ed. Charles Bazerman and David Russell. Davis, CA: Hermagoras Press, 1994.

Miles, Libby, et al. "Commenting on Douglas Downs and Elizabeth Wardle's 'Teaching about Writing, Righting Misconceptions." College Composition and Communication 59.3 (2008): 505-511.

Miller, Carolyn "Genre As Social Action." Quarterly Journal of Speech 70 (1984): 151-67.

Monroe, Jonathan. "Writing and the Disciplines." Peer Review 6.1 (Fall 2003): 4-7.

Moskovitz, Cary and David Kellogg. "Primary Science Communication in the First-Year Writing Course." College Composition and Communication 57.2 (2005): 307-34.

Myers, Greg. Writing Biology: Texts in the Social Construction of Scientific Knowledge. Madison: University of Wisconsin Press, 1990.

Nelson, Jennie. "That Was an Easy Assignment: Examining How Students Interpret Academic Writing Tasks." Research in the Teaching of English 24.1 (1990):362-96.

Paltridge, Brian. "Genre, Text Type, and the Language Learning Classroom." ELT Journal 50 (1996): 237-243.

Penrose, Ann M. and Steven B. Katz. Writing in the Sciences: Exploring Conventions of Scientific Discourse. New York: St. Martin's Press, 1998.

Petraglia, Joseph, Ed. Reconceiving Writing, Rethinking Writing Instruction. Mahwah, NJ: Lawrence Erlbaum, 1995.

Prelli, Lawrence J. A Rhetoric of Science: Inventing Scientific Discourse. Carbondale: University of South Carolina Press, 1989.

--- "The Rhetoric Construction of Scientific Ethos." Landmark Essays on Rhetoric of Science. Ed. Randy Allen Harris. Mahwah: Lawrence Erlbaum, 1997.

Prior, Paul. Writing/Disciplinarity: A Sociohistoric Account of Literate Activity in the Academy. Mahwah: Lawrence Erlbaum, 1998.

Rose, Mike. "The Language of Exclusion: Writing Instruction at the University." College English 47 (1985): 341-59.

Rothery, Jean. "Making Changes: Developing an Educational Linguistics. Literacy in Society. Eds. Ruqaiya Hasan and Geoffrey Williams. London: Longman, 1996. 86-123.

Russell, David. "Activity Theory and Its Implications for Writing Instruction." Reconceiving Writing, Rethinking Writing Instruction. Ed. Joseph Petraglia. Mahwah, NJ: Lawrence Erlbaum, 1995. 51-77.

---. Writing in the Academic Disciplines: A Curricular History. 2nd ed. Carbondale: Southern Illinois University Press, 2002.

Rymer, Jone. "Scientific Composing Processes: How Eminent Scientists Write Journal Articles." Writing in Academic Disciplines: Advances in Writing Research, Vol. 2. David A. Jolliffe (Ed.). Norwood, NJ: Ablex, 1988. 211-250.

Samraj, Betty. "Texts and Contextual Layers: Academic Writing in Content Courses." Genre in the Classroom: Multiple Perspectives. Ed. Ann Johns. Mahwah, NJ: Lawrence Erlbaum, 2002. 163-176.

Schryer, Catherine F. "The Lab vs. the Clinic: Sites of Competing Genres. Genre and the New Rhetoric. Eds. Aviva Freedman and Peter Medway. Bristol, PA: Taylor and Francis, 1994. 105-124.

Seidman, Irving. Interviewing as Qualitative Research: A Guide for Researchers in Education and the Social Sciences. New York: Teachers College Press, 2006.

Smit, David W. The End of Composition Studies. Carbondale: Southern Illinois University Press, 2004.

Sternglass, Marilyn. Time to Know Them: A Longitudinal Study of Writing and Learning at the College Level. Mahwah: Lawrence Erlbaum, 1997.

Swales, John M. Genre Analysis: English in Academic and Research Settings. New York: Cambridge UP, 1990.

Tardy, Christine. "Exploring the Interactions Between Writing Instruction and Disciplinary Practice: Pathways of Four Multilingual Writers." Diss. Purdue U, 2004. Print.

Thaiss, Chris and Terry Myers Zawicki. Engaged Writers and Dynamic Disciplines: Research in the Academic Writing Life. Portsmouth: Boynton/Cook, 2006.

Walvoord, Barbara and Lucille McCarthy, L. Thinking and Writing in College: A Naturalistic Study of Students in Four Disciplines. Urbana: NCTE, 1990.

Wardle, Elizabeth."Can Cross-Disciplinary Links Help us Teach 'Academic Discourse' in FYC?" Across the Disciplines 2 (2004). 3 July 2007. <http://wac.colostate.edu/atd/articles/wardle2004/index.cfm>.

---. "Re: writing studies/genre studies." Online posting. 31 July 2008. FYWasWS. 26 Sept. 2008 <http://groups.yahoo.com/group/FYCasWS/message/80>.

Winsor, Dorothy. Writing Like an Engineer: A Rhetorical Education. Mahwah: Lawrence Erlbaum, 1996.

APPENDICES

APPENDIX A: SURVEY 1

Student Survey 1 – Civil Engineering, Fall '07
Study: Writing in Civil Engineering and Zoology
Investigator: Joleen Hanson, Dept of English

1. Name _____
2. Email address _____
3. Lab Day & Time: _____
4. Gender _____
5. Age _____
6. Language(s) you use regularly other than English _____
7. Academic status (circle one) senior junior sophomore other
8. Number of semesters at UNH _____
9. Area(s) of Interest in Engineering _____
10. Expected career path _____
11. How committed are you to the career path listed in #10?

Least Committed	1	2	3	4	Most Committed

12. How confident are you about your writing skills (for the lab reports required in this class)?

Least Confident	1	2	3	4	Most Confident

13. How comfortable are you using Excel and other software used to manage lab data?

Least Comfortable	1	2	3	4	Most Comfortable

14. How many close friends or relatives do you have who are civil engineers?
15. A lab report usually includes an abstract, introduction, materials, results, and discussion sections. When you have to write a lab report, which section do you usually begin to write first?
16. Have you had any employment or internship, or done an independent study project related to your major?
17. What grade do you expect to get on the lab reports you will write for this class?

Student Survey 1 – Zoology 626, Fall '07
Study: Writing in Zoology and Civil Engineering
Investigator: Joleen Hanson, Dept of English

1. Name _____

2. Email address _____

3. Lab Day & Time: _____

4. Gender _____

5. Age _____

6. Language(s) you use regularly other than English _____

7. Academic status (circle one) senior junior sophomore other

8. Number of semesters at UNH _____

9. Major _____

10. Expected career path _____

11. How committed are you to the career path listed in #10?

Least Committed	1	2	3	4	Most Committed

12. How confident are you about your writing skills (for the lab reports required in this class)?

Least Confident	1	2	3	4	Most Confident

13. How comfortable are you using Excel and other software used to manage lab data?

Least Comfortable	1	2	3	4	Most Comfortable

14. How many close friends or relatives do you have who are life science researchers?

15. A lab report usually includes an abstract, introduction, materials, results, and discussion sections. When you have to write a lab report, which section do you usually begin to write first?

16. Have you had any employment or internship, or done an independent study project related to your major?

17. What grade do you expect to get on the lab reports you will write for this class?

APPENDIX B: SURVEY 2

CiE Student Survey - Final Study: Writing in Zoology and Civil Engineering

1. Name _____ Lab Day & Time: _____

2. How confident are you about your writing skills (for the lab reports required in this course)?

Least Confident	1	2	3	4	Most Confident

3. How comfortable are you using Excel and other software used to manage lab data?

Least Comfortable	1	2	3	4	Most Comfortable

4. How do the lab reports you wrote for this class compare to reports you have written in previous ones?

Very Different	1	2	3	4	Very Similar

5. How much time did you spend on writing one lab report for this course? (Estimate an average.)

6. Who should be able to understand the lab reports you wrote for this course?

_____any college student (any major) _____any engineering major

_____only civil engineering students or professionals _____ not sure

7. What do you expect your overall grade will be for the lab reports you wrote for this course?

8. What is your view of the following statements about using first person pronouns (I, we, our) in lab reports? (Circle one answer for each statement.)

Agree	Disagree	Not sure	**a.** Avoiding "I" and "we" is a rule of engineering writing.
Agree	Disagree	Not sure	**b.** Some use of "I" or "we" is OK, but usually I avoid it.
Agree	Disagree	Not sure	**c.** I think it should be OK to use "I" or "we."
Agree	Disagree	Not sure	**d.** Avoiding "I" and "we" sounds more professional.
Agree	Disagree	Not sure	**e.** Using "I" or "we" can make sentences clearer and more concise.
Agree	Disagree	Not sure	**f.** In scientific writing using "we" is OK; using "I" is not.
Agree	Disagree	Not sure	**g.** I know when it is OK to use "I" or "we," and when to avoid it.

9. Which of the following choices is best for a lab report?

a. The range of permeabilities for this sample (1.19×10^{-4} cm/s to 5.319×10^{-6} cm/s) **indicates that this soil sample has poor drainage**.

b. The range of permeabilities for this sample (1.19×10^{-4} cm/s to 5.319×10^{-6} cm/s) **suggests that this soil sample may have poor drainage**.

Zoology Student Survey - Final Study: Writing in Zoology and Civil Engineering

1. Name _____ Lab Day & Time: _____

2. How confident are you about your writing skills (for the lab reports required in this course)?

Least Confident	1	2	3	4	Most Confident

3. How comfortable are you using Excel and other software used to manage lab data?

Least Comfortable	1	2	3	4	Most Comfortable

4. How do the lab reports you wrote for this class compare to reports you have written in previous ones?

Very Different	1	2	3	4	Very Similar

5. How much time did you spend on writing one lab report for this course? (Estimate an average.)

6. Who should be able to understand the lab reports you wrote for this course?

_____any college student (any major) _____any science major

_____only a student or professional in zoology _____ not sure

7. A lab report usually includes different sections such as introduction, materials, results, and discussion. When you have to write a lab report, which section do you usually begin to write first?

8. What do you expect your overall grade will be for the lab reports you wrote for this course?

9. What is your view of the following statements about using first person pronouns (I, we, our) in lab reports? (Circle one answer for each statement.)

Agree Disagree Not sure **a.** Avoiding "I" and "we" is a rule of scientific writing.

Agree Disagree Not sure **b.** Some use of "I" or "we" is OK, but usually I avoid it.

Agree Disagree Not sure **c.** I think it should be OK to use "I" or "we."

Agree Disagree Not sure **d.** Avoiding "I" and "we" sounds more professional.

Agree Disagree Not sure **e.** Using "I" or "we" can make sentences clearer and more concise.

Agree Disagree Not sure **f.** In scientific writing using "we" is OK; using "I" is not.

Agree Disagree Not sure **g.** I know when it is OK to use "I" or "we," and when to avoid it.

10. If you would like to add any comments about what has helped you do the writing you needed to do for this course, please write them on the back of this form.

APPENDIX C: GUIDING QUESTIONS FOR STUDENT INTERVIEWS

Student Interview Civil Engineering - Guiding Questions

General Questions about their field of study

How did you decide on your major? How did you become interested in Civil Engineering? Have other people been a significant influence on your decision?

Where did your interest in your career plans come from?

Was there a time or an experience that was a turning point in your decision to major in Civil Engineering?

What area of Civil Engineering are you most interested in right now? How does this course relate to that?

At this point in time, if you had to place yourself on a continuum between being a student and being an engineer, where would it be?

Do you belong to any professional organizations?

Does most everyone you socialize with know that you are a Civil Engineering major?

Do you often talk with your friends about your major or career plans?

Have you had work or internship experiences related to Civil Engineering? Did it include writing?

What do you know about the writing that practicing civil engineers have to do?

General Questions about Writing & Reading & Math

What has your experience with writing been like? What writing experiences have you had? What other kinds of writing do you do? How do you feel about writing?

What other courses have you take that required writing lab reports?

How do you use professional journals? What else do you like to read?

How do feel about math?

Lab Reports in this Course

How does this kind of writing compare with writing you have done elsewhere?

- How do these reports compare to the ones you write for Fluids?
- Is engineering writing different from other kinds of writing? How?

How does the way you write now compare with the way you wrote at the beginning if fall semester? What caused the change (if any)?

What resources do you use when writing a report? Do you refer to the instructions provided by the professor? Look at previously graded labs? Talk to people (TA, lab partners)?

How did you know how to prepare the graphs?

Why do you need to cite sources in these reports? F/up: Why is this important in science?

What kind of person should be able to understand this report? Do you ever think about Mr. Einstein [hypothetical client named in the lab report assignment] when writing the report?

How do these reports compare to published reports that you have read?

Examples of Writing – (See last page of guide)
Do you prefer the examples that don't use first person pronouns? Why?
F/up: Why do engineers choose to write this way?

Describe the Process of writing this lab report – Civil Engineering.
Show me the parts of your lab report that you are most satisfied with. What is good about this part?

Are there any parts that you are not satisfied with? Why?

What parts were the most difficult to write? Why?

How do you know what to put in each of the major sections of the report (Especially the introduction and discussion)? What is the purpose of each? (abstract, introduction, procedure, apparatus, results, discussion and conclusions) Why is the results separate from the discussion?

How did your group decide who would write each part of the lab? How did you put it all together?
F/up: If you are not the team leader, do you see the results and conclusion sections before they get turned in?

Did you take any steps to make it more concise? Why is conciseness important?

How much time do you typically spend writing?

Did you talk with the lab instructors while working on this report? At any point did you want more advice or guidance than you have been given about how to write the report?

If you had had more time, is there anything you and your lab partners would have done differently with this report?

After it was returned, what did you do with it? (Has everyone read it? Do you refer to it when writing future labs?)

Summary – Civil Engineering

Overall, how do you feel about the writing you have done in this course? Are you satisfied with the grades you have received on these reports?

What advice would you have about writing for someone just starting the course?

Is there anything else you want to tell me about writing or about learning to write these reports that I haven't asked about?

Student Interview Zoology - Guiding Questions

General Questions about their field of study
Why did you make time in your schedule for this course? Is it a requirement?

How did you decide on your major? How did you become interested in Zoology?
Have other people been a significant influence on your decision?
Where did your interest in your career plans come from?

Was there a time or an experience that was a turning point in your decision to major in Zoology?

At this point in time, if you had to place yourself on a continuum between being a student and being a biologist, where would it be?

Does most everyone you socialize with know that you are a ____ major?

Have you had work or internship experiences related to Zoology? Did it include writing?

What do you know about the writing that practicing biologists have to do?

General Questions about Writing & Reading & Math
What has your experience with writing been like? What writing experiences have you had? What other kinds of writing do you do? How do you feel about writing?

What other courses have you take that required writing lab reports? What did you think of CPR in chemistry?

How do you use scientific journals? What else do you like to read?

How do you feel about math?

Lab Reports in this Course

How does this kind of writing compare with writing you have done elsewhere?
Is science writing in general different from other kinds? How?

How does the way you write now compare with the way you wrote the first report? What caused the change (if any)?

What resources do you use when writing a report? Do you refer to the instructions provided by the professor? Look at previously graded labs? Talk to people (TA, class mates)?

How did you know how to prepare the graphs?

Why do you need to cite sources in these reports? F/up: Why is this important in science?

What kind of person should be able to understand this report?

How do these reports compare to published reports that you have read?

Examples of Writing – (See last page of guide)

For "Results" section examples, ask for comment on the role of graphs in the lab report. Agree or Disagree with the following quote: "The graphs are to highlight the text; the text should not talk about the graphs"

Do you prefer the examples that don't use first person pronouns? Why? F/up: Why do scientists choose to write this way?

Describe the Process of writing this lab report – Zoology

Show me the parts of your lab report that you are most satisfied with. What is good about it?

Are there any parts that you are not satisfied with? Why?

What parts were the most difficult to write? Why?

How do you know what to put in each of the major sections of the report (Especially into and discussion)?
Why is the results separate from the discussion?
What is the purpose of each? (abstract, introduction, methods, results, discussion)
Why should there be no raw data in the results section?

How did you go about writing this lab report? Has your approach changed during the semester?

Do you take any steps to make it more concise? Why is conciseness important?

How much time do you typically spend writing?

Summary – Zoology

Overall, how do you feel about the writing you have done in this course? Are you satisfied with the grades you have received on these reports?

What advice would you have about writing for someone just starting the course?

Is there anything else you want to tell me about writing or about learning to write these reports that I haven't asked about?

Remember Gift Certificates!

APPENDIX D: EXAMPLES FOR DISSCUSSION

Student Interview Civil Engineering - Examples for Discussion

All choices are correct. Is one of the choices best for a lab report? Why? How did you learn this?

Abstract

a. After the TA prepared the specimen, we subjected it to a series of ten incremental loading steps …

b. After the specimen was prepared by the TA it underwent a series of ten incremental loading steps …

c. After the specimen was prepared, a series of ten incremental loading steps were performed…

Introduction

a. To understand a soil, it is important to know where it comes from.

b. The knowledge of where a soil comes from is important to its understanding.

c. Knowing where a soil comes from is necessary for understanding it.

Procedure

a. To begin the test, place the first load on the hanger.

b. The test was begun by placing the first load on the hanger.

Discussion

a. …there was error in the measurement of masses for this trial. Because of this, **we decided to calculate the Plasticity Index** based on the two different values of the Plastic Limit.

b. …there was error in the measurement of masses for this trial. Because of this, **it was decided to calculate the Plasticity Index** based on the two different values of the Plastic Limit.

c. … there was error in the measurement of masses for this trial. Because of this, **the Plasticity Index was calculated** based on the two different values of the Plastic Limit.

Discussion

a. The range of permeabilities for this sample ($1.19x10^{-4}$ cm/s to $5.319x10^{-6}$ cm/s) **indicates that this soil sample has poor drainage.**

b. The range of permeabilities for this sample ($1.19x10^{-4}$ cm/s to $5.319x10^{-6}$ cm/s) **suggests that this soil sample may have poor drainage**

Examples for Discussion from Animal Physiology Lab Reports

Each set of choices presents two grammatically correct ways to say the same thing. Is one of the choices best for a Zoology lab report? Why? How did you learn this?

Abstract

a. We designed an experiment to determine if consuming orange juice raised human blood glucose more than oranges or light orange juice.

b. An experiment was designed to determine if consuming orange juice raised human blood glucose more than oranges or light orange juice.

Introduction

a. Because oranges only have a GI of 42 compared to regular orange juice at 52, **it was predicted** for this experiment that normal orange juice would cause the greatest increase in blood glucose level.

b. Because oranges only have a GI of 42 compared to regular orange juice at 52, **the hypothesis for** this experiment was that normal orange juice would cause the greatest increase in blood glucose level.

Materials and Methods

a. Five samples of blood were taken in 20 minute intervals throughout the experiment.

b. Blood samples were taken every 20 minutes for 80 minutes total.

Results

a. The graph shows a peak at 20 minutes (123 ± 13.9 mg/dL) after drinking orange juice.

b. The highest average blood glucose levels for the orange juice group occurred at 20 minutes (123 ± 13.9 mg/dL).

c. At 20 minutes the orange juice group had an average blood glucose level of 123 ± 13.9 mg/dL.

Discussion

a. The data suggest the adult species may lack the ability to respond to sucrose.

b. The adult species lack the ability to respond to sucrose.

APPENDIX E: GUIDING QUESTIONS FOR INSTRUCTOR INTERVIEWS

Civil Engineering Instructor Interview - Guiding Questions

Personal Background

1. What do you hope to do after getting your M.S.? What kind of firm?

2. What other lab courses have you TA'd?

3. How did you choose this career?
   F/up: What kind of engineering jobs or internships have you had?

4. Tell me about your current research.
   F/up: Has any of it been published yet? Where might you publish it? Who will be most interested in your research?

5. How do you feel about writing in general? What kind of experiences have you had related to writing? (Writing and teaching writing)
   What memories do you have of writing lab reports in undergraduate CiE classes?
   What helps or hinders your own writing?
   How do these reports compare with other kinds of writing? (what you do now; other fields)

6. How do you expect to use writing in the future (after graduation)?
   F/up: What do you know about the kind of writing practicing Civil Engineers need to do?

7. What professional journals do you read and how do you use them?

This Course

8. What do you want students to learn from writing the lab reports in this course?

9. Should students come into this course knowing how to make graphs in Excel?

10. Discuss specific reports, asking the instructors to comment on strengths and weaknesses.

OR

Look at a report and ask, "Which sections do students tend to do well in? How does this group/student do?"

Where do students seem to have the most trouble in these reports? How did this group/student do?

11. If a student wanted to improve their reports, what advice would you give them?

12. How do you go about grading a report (show one they have done)
    F/up: Has your grading process changed since the beginning of the semester?
    Do you pay much attention to the cover letter?
    What should be accomplished in each of the main sections?

13. What kind of person should be able to understand one of these reports?

14. Is conciseness important in these lab reports? Why?
    F/up: How can students make their writing more concise?

Show Examples of Writing –
Do you prefer the examples that don't use first person pronouns? Why? F/up: Why do scientists choose to write this way?
---Maybe show the survey questions---

Summary
What advice would you have for future TAs in this class?

Do you have any ideas or suggestions about how the UNH Writing Program could provide better support for TAs (and students) in this course?

Zoology Instructor Interview - Guiding Questions

What do you hope to do after getting your M.S. or PhD?

What other lab courses have you TA'd?

How did you choose this career?
Follow-up: How have other people influenced your decision to study zoology? Have other people …
___provided encouragement
___been a role model
___a good teacher who made the subject interesting
___ pressured or coerced your decision

Tell me about your educational and research background. What kind of science jobs or internships have you had?

Tell me about your current research.

Has any of it been published yet? Where might you publish it? Who will be most interested in your research?

Tell me about you own professional writing experiences.
Follow-up:
a) What kind of documents have you written?
b) What has been helpful to you in learning to write these documents? What hinders you?

Was there a time or experience that was a turning point in your decision to become a research biologist? When did you first think of yourself as a biologist (rather than as a biology student)?

What scientific journals do you read and how do you use them?

What memories do you have of writing lab reports in undergraduate Zoology classes?

What do you want students to learn from writing the lab reports in this course?

What is the advantage of separating the results and discussion sections?

Why should there be no raw data in the results section?

If a student wanted to improve their reports, what advice would you give them?

How do students benefit from taking this course?
Follow-up: How do the lab reports in this course compare to the kinds of writing you have to do at this point in your career?

How can students make their writing more concise? Why is conciseness important?

Discuss specific reports, asking the instructors to comment on strengths and weaknesses.
OR
Look at a report and ask, "Which sections do students tend to do well in? How does this group/student do?"

Where do students seem to have the most trouble in these reports? How did this group/student do?

Why do students need to cite other research articles in this report? F/up: Why is citation important in any research report?

Do some sections take more time to grade?

How does this student's report compare to ones written earlier in the semester?

Examples of Writing – (See last page of Appendix 2)
For "Results" section examples, ask for comment on the role of graphs in the lab report. Agree or Disagree with the following quote: "The graphs are to highlight the text; the text should not talk about the graphs"

Do you prefer the examples that don't use first person pronouns? Why? F/up: Why do scientists choose to write this way?

Summary
What advice would you have for future TAs in this class?

Do you have any ideas or suggestions about how the UNH Writing Program could provide better support for TAs (and students) in this course?

APPENDIX F: SAMPLE GENRE AWARENESS PROFILE

Student ID: MAM1DD Interview Date 11/7/07

Survey Data

Gender: M	**Age:** 20	**Year:** junior
Area:		
Expected Career Path: Civil Engineering		
Writing Confidence	4	3 (4=high)
Confidence with Excel	3	3 (4=high)
Expected Course Grade	B+	B

1. Background - Literacy Experiences and Disciplinary Identification

Literacy:

Reading:

breeze through those [the concrete magazines]

Writing:

Confidence: Feels successful and confident as a writer in different contexts (p3); sees himself as an analytical thinker and this contributes to his writing

I feel pretty good and different styles of writing too like in in 11th grade English I wrote a couple papers and my English teacher just loved it. I dunno I guess I'm just I don't know how but I guess it just comes easily to me (p 3)

Breadth of Experience

does not see a huge divide between his writing about lit in AP English and his writing in lab reports. Both are analytical. But they rely on different kinds of evidence. Did not have comments about style issues. Technical style feels natural for him.

I took an AP English class in high school That really helped me to be more analytical [9:06 p 2 See more below about how it was helpful] ALSO got him out of taking FYC (p 3)

Took TW for engineers: By that point I felt I was already prepared. That class wasn't too difficult for me. I guess from that I learned more about a couple of the bigger things would be focusing on who your audience is...[and format of letters and memos, "how writing is used in the workplace"]

J: Do you do any other kinds of writing on your own?

R: No just essays. I am taking a Spanish class, 100 word essays [writes in English]

Math:

General

Statistics

Tables & Graphs

Genre Acquisition:

Similarity of reports to previous 2 (4 is most similar)
Section writes first: Materials
What part does he like to write best: N/A
Motivation in this course: professional use or grade

Significant preparatory experiences

AP English: What was really good about that class to was that we could write a paper and.. the first time you would always get a really bad grade... because the teacher would just tear it apart. 9:35 but it was really helpful because we were able to re-do it and re-do it and re-do it. Really I think all my grades were like 90 or better because you'd keep re-writing em. ...you'd make a statement, and he'd be like "Explain this" or "why?" and so then you'd have to like not only say what you saw, but explain why you saw it and how it built up and then you'd explain like relevant information in today's time or whatever you could take one little sentence and then turn that whole sentence into a paragraph. So I think that really helped me. (p2)

Dad gave feedback about organization and structure: ever since I was like in grade school my Dad would always read my papers for me. I think that helped a lot too as far as being organized cause he would like it was kind of frustrating because I would spend a lot of time writing a paper and then he would like tear it apart yk like. I used to get in fights with him over it and that helped me too. That was typically organization thing. Getting more structure into my paragraphs getting a more defined introduction and a more defined conclusion and just I'd say organization and structure. He helped me with that a lot (p 2)

Disciplinarity –

Career Commitment	4 (4 is most committed)
Friends/Relatives in field	4 - Dad and brother are CiE; brother a UNH program grad; interviewed his brother about writing on the job for TW course.
Source of Interest	I think that have that kind of brain mentality having that way of looking at things is how I got into it. [theme for him] My Dad always would ask me "how does that work?" .. and my brain just started to work that way. (p. 1)
Length of career interest	Since childhood. See above
Specificity of career interest	Specific. US Navy CiE Corps; Likes structural and wants to add some environmental courses. After taking more engineering electives he will have a better idea of what he wants to specialize in
Continuum response	I'm definitely more of a student. You don't really become an engineer until you've had working as an engineer. School just really prepares you for the mentality of how to think as an engineer, not necessarily knowing engineering work... you don't

	actually start the you start the engineering work once you've graduated I dunno that's kinds the vibe I get talking with my brother. A lot of the stuff they learn in school he doesn't actually use. But he's like it's that same thinking mentality, thought process or ahh being able to work through a problem that he learned in school
Work/Internship	Yes on survey BUT no in interview. plans to join the Navy after grad. Join the civil engineer corps. This is the same program my Dad did. They pay a monthly stipend while you are in school and they pay you to get good grades. I'll even make the Dean's list and they give you a pay raise. When I graduate I'll go through some basic training and then I'll start working as an engineer the next fall. J: So you've got a job lined up R: That's why I've been more tentative getting experience because I have something guaranteed. But this summer I want to work on the shipyard in Portsmouth (p 2)
Friends know?	Yeah especially at school… a lot of my friends are engineers too but even kids that aren't they're like "Dave you wanna go hang out?" and it's like "Ahh I got work to do." And they're like "Oh yeah you're an engineer." So

2. Extent of genre awareness as defined by Devitt-

Rationale for Genre Conventions

avoiding first person pronouns	EXAMPLES – In the first one he focused on TA not on FPP, but same idea: J: Why did you not want to refer to the TA? R: Well because you are trying to sound professional, So it would be the same thing even if we weren't students. You wouldn't say "The technician did this" or you'd just say that it was done.(p 7) In the plasticity one, he chose "C" saying "I think that is short and to the point" J: this issue of the "we" and the FPP. You said "that's not how you write in a technical document." Why do you think that is and do you agree with that? R: Uhmmm. I don't really know why. I think it kinds might detract just detract from the purpose of why you are writing. It doesn't really matter I dunno I guess I

	would just say it detracts from the rest of the document [pause] if you say we or I. Lots of times it probably not the person that conducted the lab that is writing the report, so you'd be saying "he" and "she" and stuff so it's kinda (p 8).... R: **Lots of times you would have technicians ro interns doing the experiments or tests or something** like that. It's just a thought. J: I was just curious about it. But in other kinds of documents, like the letter to Mr Einsten, then you can use we or i R: Uhmmm I don't think you are supposed to. J: OK R: I dunno. I guess **I have always been taught to steer clear of it. I don't really know why.** J: OK Does that seem natural to you when you write? R: Now it does, yeah. I'm pretty it is not too often that I'll be typing and then it is like "Oh backspace" I'm like pretty well adjusted to it. So. it's not bad. (p 8)
citation of sources	J: Why do you think that is important in a lab report? To cite the source R: Uhmm You have to make sure the source is credible. You have to show that you actually got it from somewhere. It gives you credibility saying that I'm not just making this up (p 4) When you compare your data to other people's data that is commonly accepted throughout the engineering public, uhmm it just shows that what you are doing is relevant to what other people have done and the results that you've got are in the right ball park. (p. 6)
conciseness	that in TW you are supposed to be very concise. You don't want to use a lot of words you want to just spit out the facts and not too much else just get to the point pretty much uhmm of course you want to sound professional and you don't want to use improper English or use a whole bunch of little you know small words. But at the same time you don't want to use words that are like vague or anything (p 4) J: OK Why do you think it is valuable. Why is that a value in TW to be concise? R: Like my Dad he reads a lot and I know that he we'll both read something together and he is seriously done like 3 times as fast as I am . He just skims through it and he can just pick out the words and he has a pretty good understanding of what it was being talked about. Uhmm SO I think that that's a lot of it yk you just have to be -

	able to just get to the point. It's a technical document you just need the info from it. SO you just need to take away the information just so you have an understanding of what happened and what's being written about. So all those extra words just take up space. (p 9)
statements reflecting certainty	Did not ask

Other References to audience, purpose/use of report, underlying beliefs/values

Re: Tech Writing - I learned more about a couple of the bigger things would be focusing on who your audience is. As an engineer that's definitely important because you have a lot of different audiences. (p3)

Re: audience

J: ...they gave on the lab assignment from Mr Einstein. Is that in your minds at all when you are writing

R: Actually a couple of times I think that really has helped me to know that you are you to think of it as you are writing to this company and you have to explain to this company yk if you want their business you have to prove that what you are doing is relevant and what you are doing is correct. I think that has helped. Uhmm just to kind change your perspective. Not just to say "I have to get this lab report done. I have to put this information in there. But like somebody is really going to be reading this yl and I have to really explain this to them so that they understand and so they know that what we did was good stuff. 37:40 so yeah I think that has helped (p 7)

J: Audience who should understand the report technical or non-technical

R: I think most of ours have been written in pretty relaxed terms. Who would actually read it. It would probably be other engineers that would be reading it. But at the same time it could be that this report could end up in front of a town board if you are trying to decide if these materials .. so its possible that you have laymen or average citizens reading it. It's probably a pretty broad audience. (p 7)

Use of Rhetorical Vocabulary

Control of own Writing versus Conforming to Standard

Variability within genre

Transfer of learning between genres

How lab report compares to Real World Writing

J: Do team mates comment on what you write before it gets turned in?

R: Ideally that would happen [the first few labs he emailed the discussion and analysis to group members in case they wanted to comment on it "that never really happened. Everyone was kinds too busy with their own thing. I know in the real world in the work force that's how it would be[get checked by teammates]. So I yk our lab leader

probably skimmed through it probably checked to see whether there is anything major missing. Probably checked grammar and stuff, but I doubt that anyone really else really researched it or checked stuff out on line.(p 5)

He knows this is done in the workplace because of Ray Cook's class and from interviewing his brother:

R: In one of our classes, Intro to Civil Engineering, Prof Cook always had us do a homework with a doer and a checker. [describes it]... And then my brother when I interviewed him he talked about that a lot. When you are actually on the job you have a lot more responsibility and liability so ahh it's really important that your work is good so

Compares these reports to earlier ones:

J: so people check on each other. OK Do you feel that these lab re 29:34 reports are different from lab reports that you've done in earlier classes?

R: Uhmm only in that these are a lot more detailed and specific uhmm we've never really had to check up with standardized data or accepted values never really had to compare our stuff to accepted values before uhmm these are just a lot more in depth, the TAs really expect a lot. You have to really pull in a lot of outside data a lot of history or a lot of explanations and that's a lot more difficult there's a lot more after you actually do the lab and you have your data and results there is still a lot of work to do. You still have to like research and that type of thing. That does add a whole nother level of credibility to your report. I'd say that's where it is difficult.

J: OK because in earlier classes you just did your report. It was limited to what happened n the lab. (p 5).... you have to do some pretty complicated graphing. Is that typical?

Rob: Yeah this is the first year that we've done log-log graphs or graphs on log paper. I never even had heard of it until this year until fluids class...[SEE "tensions" for more on how he learned to do this graphing]

Description of Differences between kinds of writing

J: 13:42 I am assuming your AP course was different from Materials how would you characterize the difference between those kinds of writing?

R: Uhh I'd say they are both analytical but in a different sense. Uhmm engineering technical documents you have to be analytical in terms of like backing up what you say or explaining things so like using ahh equations or ahh explaining using examples uhmm that type of thing whereas in literature its more abstract or like I dunno I am having a hard time explaining what I mean. It's more like ahh I dunno I guess its more abstract I can't put a finger on it.

J: What you seem to be saying here's what I understanding is that they are both analytical but that what counts as evidence is different. Would you say that?

R: Yeah that's what I am trying to say that's good.

J: And what would count as evidence is more abstract.. certainly not calculations laughs

R: right that would be like more subtle things or like details in the story or yk like if you're trying to describe a character and you say the character has this quality then you have to go back and say well from this example in the story I'd say this character has this quality or something like that

Describes importance of conciseness here (pasted in table below)

3. Tensions learning the genre of the advanced lab report –

Feels his group has been successful from the first one. He is able to describe what belongs in each section. His description of the discussion and conclusion match CiETA1's pretty well. :

the discussion and conclusion is to analyze the results and say "this are the reasons we got these results, these are what these results mean. Typically to describe every figure in the results section. I think there are about like there's 4 tables and a graph so I should have information in the discussion and conclusion about each one of those things describing what they are what they mean and if you had any crazy data why that would have happened. (p 4)

Graphing – more sophisticated:

J: How do you learn to do this [log-log graphs] This is new and different How do you learn to do it?

R: Right Honestly whoever did this graph. Whoever did this graph.. if I did it I would just look in the online text because I know there's an image almost exactly like this in the online text. As far as if I had no resources I never would have thought to use log paper. I'm sure that is just for whatever reason it is probably just more visually yk can see better what is going on on that type of graph. I dunno. Yeah but when I was learning it for the first time. It was just a matter of looking at examples. I remember my friend Tom and I were trying to figure it out. 33:38 ON the HW we were given a website that explained it. But I didn't think it explained it very well. But between the examples given on that and the examples given in our homework we were able to figure it out.

J: OK I see that graphing counts as part of writing where are people learning this? Resources and models seem to be what you've done..

Explaining the meaning and use of the lab with more detail (CiETA2 student!)

J: Do you feel that the way you are writing reports now has changed since he first the lab?

R: Just in that it I've been looking more for details and examples, been more analytical giving more in depth answers and explanations. I guess that's the only way I've changed

J: and has it been [the TA's] comments that helped you do this.

R: Yeah or just circling something or saying "why" "Where does this come from?" or "Give an example" type of thing Yeah even until this year I never really thought of that. I guess I said that in my AP English class I saw that a little bit whh [lights go out] and actually before we wrote this first lab he told us that too. He told us to look for outside information and that we would have to research stuff and so when I wrote it I thought I did a good job. I thought I did what he was asking but he still wants more. I guess there's a lot of it that you have to really try and include. Some of it's probably tough too because as students we don't have a total concept of like the whole lab like

what yk the really big picture. We're kinda like zoomed in on this one little experiment that we are doing and not necessarily OK well if we are studying the aggregates, we're just studying the aggregates and not looking at the concrete or how it affects the building and all that kind of stuff. So that would probably be more helpful if we had a little more of the big picture idea But that's that biggest thing that has changed I've been trying to be more detailed.

We talk about making writing concise on pp 8-9. He feels he knows how to do this if he can take the time to re-read what he has written:

R: So yeah I think just deleting words like that and combining sentences is how I make things concise.

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IRB #: 4048
Study: Genre Awareness in Zoology and Civil Engineering
Approval Date: 27-Aug-2007

The Institutional Review Board for the Protection of Human Subjects in Research (IRB) has reviewed and approved the protocol for your study as Exempt as described in Title 45, Code of Federal Regulations (CFR), Part 46, Subsection 101(b). Approval is granted to conduct your study as described in your protocol.

Researchers who conduct studies involving human subjects have responsibilities as outlined in the attached document, *Responsibilities of Directors of Research Studies Involving Human Subjects.* (This document is also available at http://www.unh.edu/osr/compliance/irb.html.) Please read this document carefully before commencing your work involving human subjects.

Upon completion of your study, please complete the enclosed pink Exempt Study Final Report form and return it to this office along with a report of your findings.

If you have questions or concerns about your study or this approval, please feel free to contact me at 603-862-2003 or Julie.simpson@unh.edu. Please refer to the IRB # above in all correspondence related to this study. The IRB wishes you success with your research.

For the IRB,

Julie F. Simpson
Manager

cc: File
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